Reference Manual

IBM 24 Card Punch

IBM 26 Printing Card Punch

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IBM

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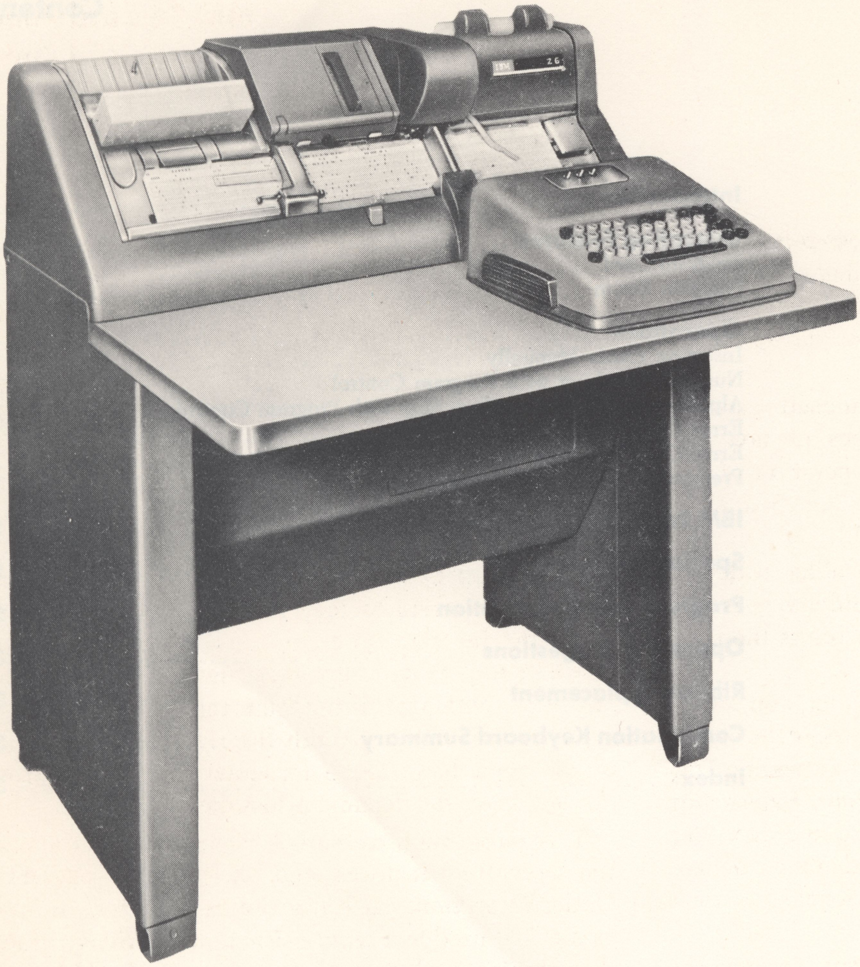

Figure 1. IBM 26 Printing Card Punch

IBM 24 Card Punch
IBM 26 Printing Card Punch

The basic operating unit in IBM accounting is the punched card. Punched cards, containing original data in the form of punched holes, actuate the IBM machines to perform automatically the various operations essential to recordkeeping.

Transcribing original data to punched cards is accomplished by any of several types of IBM card punches. This manual explains the operation of two of these machines, the IBM 24 Card Punch and the IBM 26 Printing Card Punch (Figure 1).

These two machines are essentially alike in design, features, and operation. The major difference is that the printing mechanism of the IBM 26 prints the characters on the cards as they are punched.

The machines are easy to operate, quiet, and attractive. One of their most important features is the simple means of setting them up quickly for automatic control of skipping, or duplicating operations. Each setup, or program, is made by punching a card and mounting it on a program drum, which is inserted in the machine. The same program card can be used repeatedly for a routine punching operation.

The card punch duplicates common information from any card into the following card in a gangpunch operation. The duplication can be automatic or through the keyboard. This method of duplicating avoids much card handling and consequently increases production.

The duplicating feature greatly facilitates error correction during keypunching. When an error is made, the operator need not re-punch the whole card manually. Instead, without any card handling, the operator duplicates into the next card all correctly punched fields and re-keys only the field in error. The program control permits such duplication, field by field, without concern about column numbers.

Duplication under program control proceeds at a rate of 20 columns per second on the IBM 24, and 18 columns per second on the IBM 26. Skipping and card release proceed at a rate of 80 columns per second. After one card is punched in column 80, the next card feeds into the column-1 position in one-fourth of a second.

Note: Where two speeds are indicated in this publication, the lower speed refers to the IBM 26 and the higher speed to the IBM 24.

The almost complete visibility of the cards in the card bed facilitates the design and punching of dual cards and the identification of prepunched cards into which more data must be punched. Direct access to all parts of the card bed also permits easy manual insertion and removal of cards when necessary.

The keyboards can be moved anywhere on the reading board, for the operator's greatest convenience and comfort. A combined alphabetic and numeric keyboard utilizes a novel principle to facilitate the punching of cards containing both alphabetic and numeric fields. A group of the right-hand typewriter keys serves for punching digits as well as letters, with the shift from one function to the other normally made automatically by the program card. This permits the operator to punch an alphabetic field with both hands and then, without shifting from the *home* position, to punch a numeric field with the right hand only. Use of the right hand alone for numeric punching frees the left hand for document handling.

This publication contains a complete description of the operating features and methods of operation. Under *Operations*, each function is described in detail as it is first used in a typical situation. All functions and the combination keyboard are summarized under *Combination Keyboard Summary.*

More information on these machines appears in these publications:

IBM *357 Data Collection System Installation Manual—Physical Planning*	A24-1032
IBM *1001 Data Transmission System Systems Reference Library Publication*	A24-1029
IBM *26, Model 21 Interpreting Card Punch Bulletin*	G24-1060

Card Punching

Eighty columns on the card can be punched, as shown in Figure 2.

Each column has twelve punching positions; one each for the *digits* 1 to 9, and one each for the *zones* 0, 11, and 12. The 11-zone punch is sometimes referred to as X. As illustrated, digits are recorded by punching a single hole in the corresponding digit or zero position of the desired column.

A letter is a combination of one zone-punch and one digit-punch in the desired column. For example, A is the 12-zone and digit-1 punches, N is the 11-zone (X) and digit-5 punches, and Z is the 0-zone (zero) and digit-9 punches. Some machines have special-character keys.

A special character is one, two, or three holes in the desired column as shown in Figure 2. Punching of two or three holes in one column for a letter or special character is automatic when the corresponding key is pressed.

A maximum of four punches can be duplicated into a single column on the IBM 24 Card Punch. However, duplicating in a single column on the IBM 26 Printing Card Punch must be limited to multiple punches that make up a printable character, regardless of the setting of the print switch. This eliminates possible damage to the printing mechanism.

Punched cards are usually designed so that each item (or field) of information recorded in the card can be readily identified. Figure 3 shows a card designed for use in a sales accounting application, and a typical invoice from which the card was punched. The card contains, in punched-hole form, descriptive information such as customer name, customer number, and location printed in the heading of the invoice, and quantitative data for the first commodity printed in the body of the invoice. The fields on the card are in the same sequence as the corresponding items of information on the invoice. This simplifies the reading of the original document as the information is being punched.

The card form also illustrates other operations characteristic of many card-punching jobs. For example, columns 1 through 17 are always skipped; columns 18 through 56 are punched in the first card for an invoice, and duplicated into all other cards for that invoice; and columns 74 to 80 (invoice amount) may be punched in some cards and skipped in others.

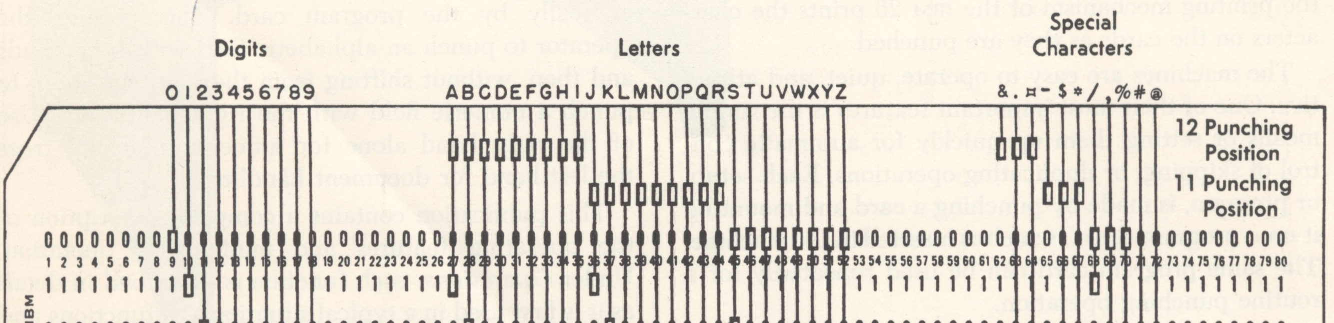

Figure 2. Punching Positions in Card

GENERAL MANUFACTURING COMPANY

ENDICOTT, N. Y.

CUSTOMER'S ORDER NO. 311 INVOICE DATE 12-31 INVOICE NO. 12349

SOLD TO
New Mexico Company
216 Wysor Building
Houston, Texas

CUSTOMER NO. 59751

SHIP TO Above

SALESMAN Macy-67

Make all checks payable to

GENERAL MANUFACTURING COMPANY
Endicott, N. Y

SHIPPED VIA Truck Prepaid

TERMS 2% 10 Days Net 30

QUANTITY	COMMODITY No.	DESCRIPTION	PRICE	AMOUNT
		Casters		
40	11202	Sq. Shank Swivel	.83	33.20
75	13102	Flat Top Rigid	.84	63.00
5	17203	Ext. Shank with Brk.	1.62	8.10
2	32105	Bolt and Nut Shank	2.64	5.28
4	44104	Rnd. Spr. Ring Stem	3.51	14.04
40	62110	Bolt and Nut Shank	7.25	290.00
		Freight		.78
				414.40

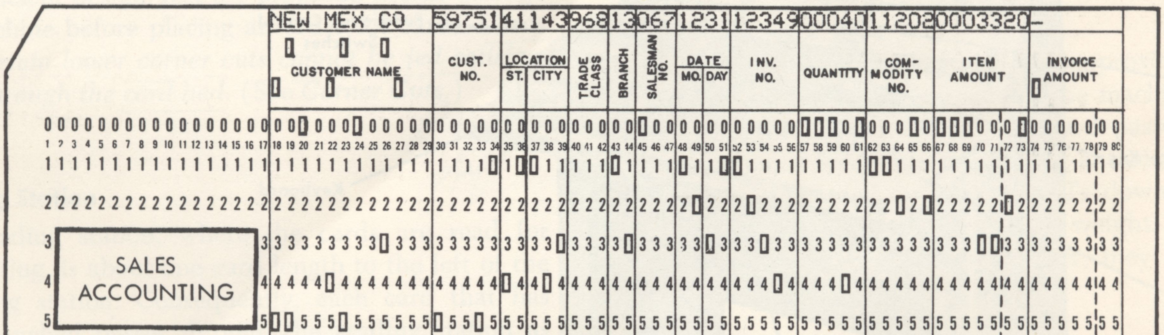
NEW MEX CO
59751
41143
968
13
067
1231
12349
00040
11202
0003320
-
CUSTOMER NAME
CUST. NO.
LOCATION
ST.
CITY
TRADE CLASS
BRANCH
SALESMAN NO.
DATE
MO.
DAY
INV. NO.
QUANTITY
COM-MODITY NO.
ITEM AMOUNT
INVOICE AMOUNT
SALES ACCOUNTING
IBM

Figure 3. Document and Punched Card

Operating Features

Figure 4 indicates the operating features described here.

Card Hopper

The card hopper, with a capacity of approximately 500 cards, is on the upper right side of the machine. Place cards in the hopper face forward, 9's down. A sliding pressure plate ensures uniform feeding.

When the cards are in the hopper and the pressure plate is in position, the top portion of the card above the zero row is visible from the left edge of the card through column 9, from column 29 through column 52, and from column 72 to the right edge of the card (Figure 5). Because cards feed from the front of the hopper, any markings in these three sections on the next card to be fed can be seen while the card is still in the hopper. This feature is most advantageous in punching serially numbered cards or cards that are partially punched and interpreted.

A card feeds from the hopper to the card bed automatically or when the operator presses the feed key. The first two cards to be punched must be fed by key, but all other cards in the hopper can be fed automatically, under switch control.

Punching Station

study

Punching is performed at the first of two stations in the card bed through which the cards pass from right to left. Usually, to start an operation, two cards are fed into the card bed at the right of the punching station. As the second card is fed in, the first card is automatically registered for punching—that is, it is positioned at the punching station. While the first card is being punched, the second card is at the right in the card bed. When column 80 of the first card passes the punching station, the second card is registered at the punching station, and the next card in the hopper is fed into the right of the card bed. This method of card feeding minimizes the time required for feeding and ejecting.

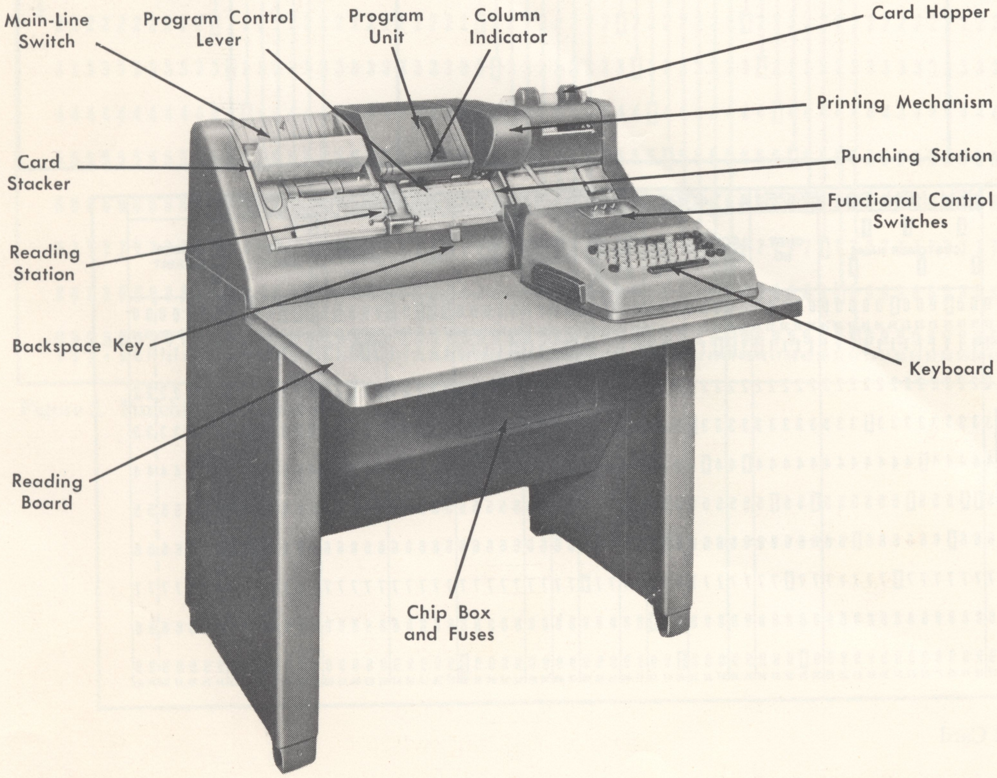
Main-Line Switch
Program Control Lever
Program Unit
Column Indicator
Card Hopper
Printing Mechanism
Card Stacker
Punching Station
Functional Control Switches
Reading Station
Backspace Key
Keyboard
Reading Board
Chip Box and Fuses

Figure 4. IBM 26 Operating Features

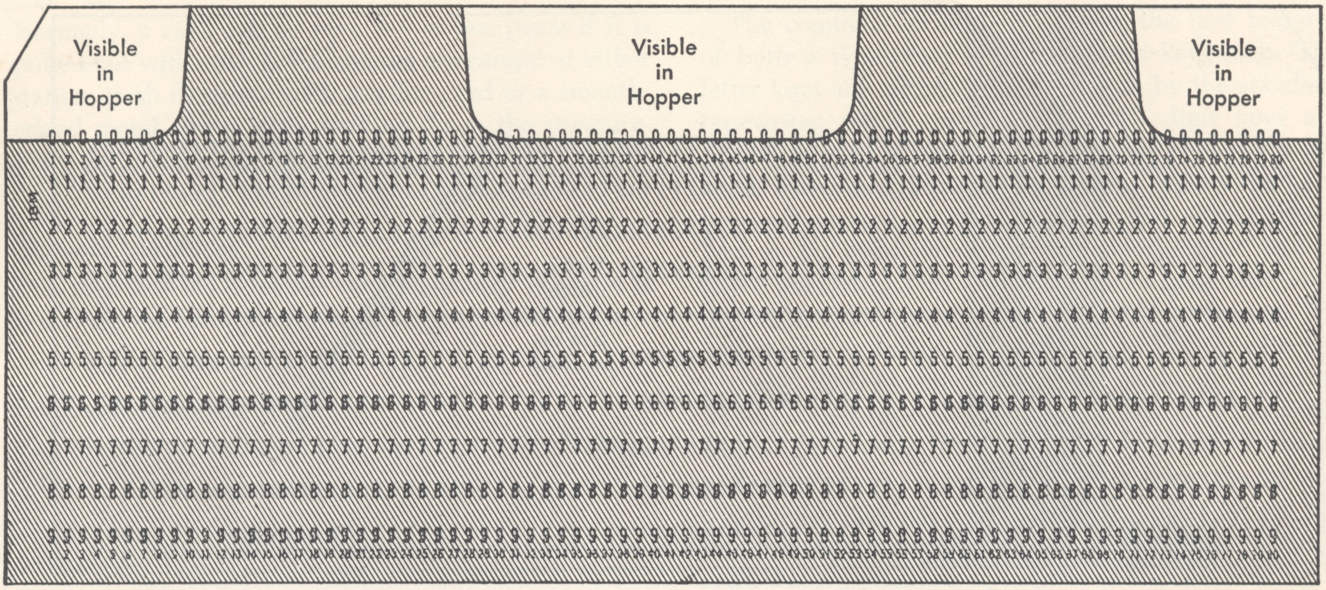

Figure 5. Card Visibility in the Card Hopper

A single card can be placed in the card bed by hand and registered in punching position by key.

The whole card is visible before it is registered, and at least 71 columns are visible after punching has started. For example, when column 15 is to be punched (Figure 6), columns 1-12 and columns 22-80 are visible. This feature simplifies the design of dual cards and facilitates keypunching. Information can be recorded (marked or printed) on a dual card anywhere other than in the two columns to the left or six columns to the right of the column in which the information is to be punched. The narrow pressure arm and the plastic guide in the right of the card bed must be considered, however, when designing dual cards. For most efficient design, test the proposed design through the machine before placing an order for cards. *Cards with certain lower corner cuts cannot be fed satisfactorily through the card bed.* (See *Corner Cuts.*)

Lower Left

Reading Station

The reading station, where the cards are read for duplicating, is about one card length to the left of the punching station. Consequently, each card that has been punched passes through the reading station as the next card is being punched. The two cards move in synchronism, column by column, and information to be duplicated is transferred from the first card to the second. This principle of duplication is the same as gangpunching. Reading from one card to another can be controlled, field by field, so that only the desired information is duplicated.

This feature eliminates card handling for the duplication of information from cards prepared during the punching operation. Card handling is necessary only when an operation requires duplication from prepunched master cards. In this case, insert the prepunched master card manually at the right of the reading station before the next card to be punched is registered. Then, register both the master card and the detail card at their respective stations by pressing the register key.

The whole card is visible before it is registered at the reading station, and at least 68 columns are visible after reading has started. For example, when column 15 is being read, columns 1-8 above the 7-row and columns 21-80 are visible.

Card Stacker

This

The card stacker, with a capacity of approximately 500 cards, is on the upper left side of the machine on a level with the hopper. After each card passes the reading station, it feeds into the stacker automatically or by key. Cards stack at an angle, 12's down, face back, and are held in position by a card weight. When the cards are removed from the stacker, they are in their original sequence.

Main-Line Switch

This

The main-line switch is at the rear of the stacker. The machine can be started about one-half minute after the main-line switch is turned on. This allows sufficient time for the electronic tubes to heat. When the stacker becomes full, the switch automatically goes off.

When the main-line switch is turned on, press the release key before starting operation. This ensures that

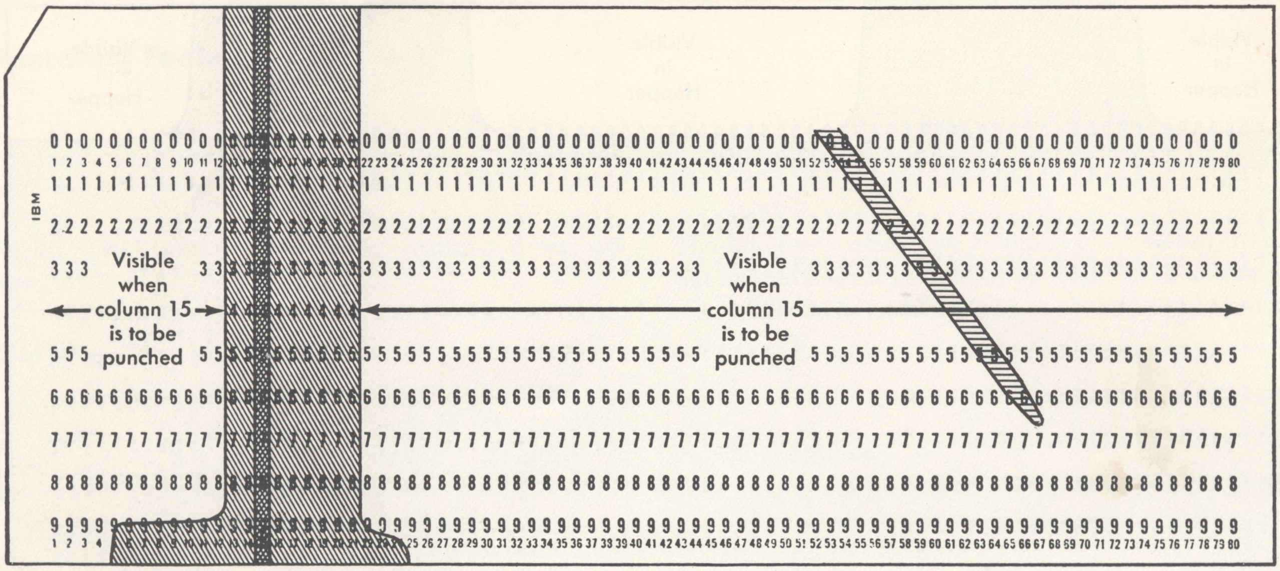
IBM
Visible when column 15 is to be punched
Visible when column 15 is to be punched

Figure 6. Card Visibility at the Punching Station

the program card is at column 1 and that any card at the punching station is released.

Reading Board

A reading board provides ample space for source documents from which the cards are punched. If extra space is required, a larger reading board extending about ten inches to the left of the standard board is available.

Backspace Key

Both

This key is below the card bed, between the reading and punching stations. As long as it is held down, the cards at the punching and reading stations backspace continuously until column 1 is reached. At the same time the program card, which controls skipping and duplicating, also backspaces. Backspacing should not be attempted after column 78 is passed without first removing the card from the card bed at the right.

The backspace key can also be used to release the keyboard after it has been locked (described in *Keyboard Locking*) on IBM 24 punches with serial numbers higher than 23639 or IBM 26 punches with serial numbers higher than 12260.

Program Unit

The program unit controls automatic skipping, automatic duplicating, and shifting from numeric to alphabetic punching and *vice versa.* Each of these operations is designated by a specific code recorded in a program card. The operator fastens the program card around a program drum and inserts it in the machine, where it is read by a sensing mechanism. The drum revolves in step with the movement of the cards past the punching and reading stations so that the program codes control the operations, column by column. Thus, the program unit affords a highly flexible means of controlling automatic operations.

The program unit also controls printing functions as described under IBM *26 Printing Features.*

Program Control Lever

This

The program control lever, located below the program unit, controls operation of the program unit. Turn on this lever to lower the program sensing mechanism so that it rests on the program drum, and the codes punched in the program card control the various automatic operations. Turn off the lever to raise the program sensing mechanism so that the program drum can be easily removed or inserted. Turn this lever to the OFF position whenever a program card is not in the machine.

Column Indicator

This

The indicator, located at the base of the program-drum holder, indicates the next column to be punched. Refer to this indicator as a guide for spacing or backspacing to a particular column.

Pressure-Roll Release Lever

This

The pressure-roll release lever is next to the column indicator. Press this lever to permit the manual removal of a card from the punching or reading station.

also this

Normally, a card can be removed in one piece if it is pulled out with care. If torn pieces are caught at either station, push them out with another card or a smooth-edged metal blade while holding down the pressure-roll release lever. Do *not* use *saw-edged* metal blades.

Chip Box and Fuses

The chip box is under the reading board. When it is removed, the fuses for the machine are accessible.

Printing Mechanism

This feature is available only on the IBM 26 Printing Card Punch.

Keyboards

Read over

Specify any one of two types of cable-connected keyboards: Figure 7 shows the numeric keyboard only (two special characters: — and &).

Figure 8 shows the combination alphabetic and numeric keyboard (four additional special character keys—11 special characters in all).

Ok

On all keyboards, the punching keys are gray with blue lettering and the control keys are blue with white lettering. The *home* keys are more concave than the other keys to facilitate accurate touch operation. The keyboards are so interlocked that no two character keys can be completely pressed at the same time, but it is not necessary to wait for one key to rise before pressing another. This design permits *rolling* of keys. To punch multiple digits manually in one column, hold down the MULT PCH (multiple punch) key while pressing the keys one at a time. If the punch is not equipped with a multiple punch key, use the space bar.

The combination keyboards have the best features of both a typewriter and a numeric keypunch. The letter keys are arranged for operation by the standard typewriter touch system, while the digit keys are placed so that a rapid 3-finger touch system can be used. The usual numeric keys on a typewriter have been eliminated; instead, a group of dual-purpose keys at the right serves for digit punching as well as letter punching. This permits numeric punching with the right hand from the normal home position for alphabetic punching. The touch system for the ten numeric keys is: index finger for digits 1, 4 and 7; middle finger for digits 2, 5, and 8; and ring finger for digits 0, 3, 6 and 9. The punching of a digit or a letter with any of the combination keys depends on the shift of the keyboard. For example, pressing the 4-J key punches a 4 when the keyboard is in numeric shift, but a J when in alphabetic shift. This shifting is similar to upper or lower case shifting on a standard typewriter and may be controlled automatically by the program unit or manually by key. The section containing the combination keys is readily distinguishable by the blue area of the key plate. On the combination keyboard, the fourth row of keys contains four special-character keys at the left. These keys punch eight characters as shown on the key tops; four in numeric and four in alphabetic shift.

The blue keys, which control functions of the machine, are explained under *Operations*.

The green correction key is explained under *Special Features*.

Read over

Function Control Switches

Two ON-OFF switches, controlling automatic functions, are explained under *Operations*. A third switch, to con-

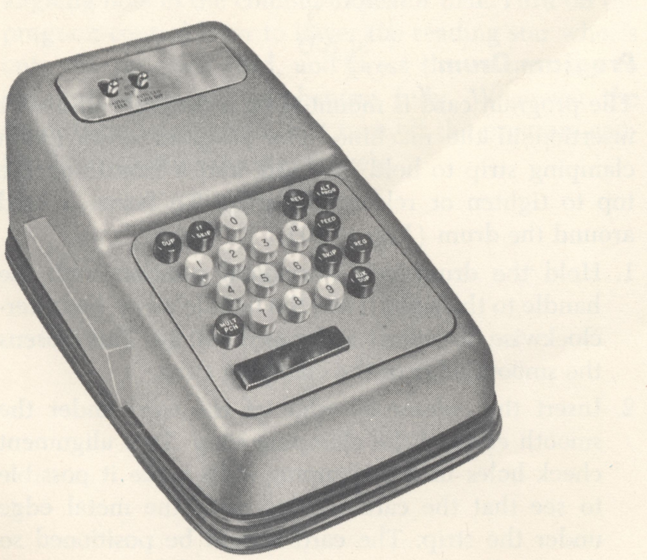

Figure 7. Numeric Keyboard

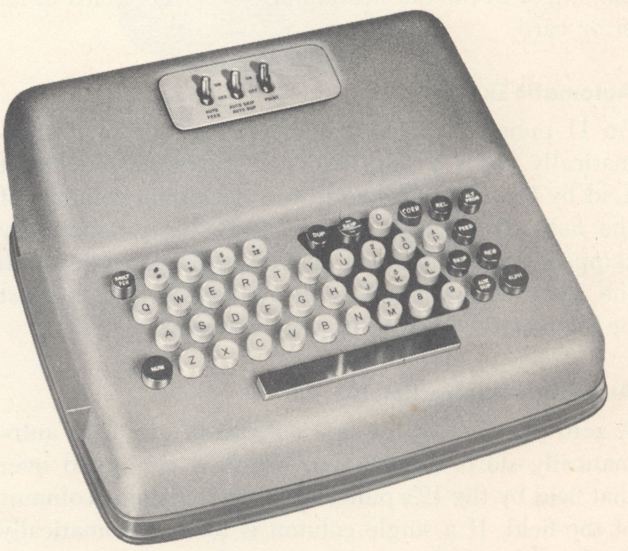

Figure 8. Combination Alphabetic and Numeric Keyboard

trol printing, is explained under IBM *26 Printing Features.* These three switches are:

AUTO FEED
AUTO SKIP AND AUTO DUP
PRINT

Program Card

A program card, which is a basic part of the program unit, is prepared for each punching application and can be used repeatedly. Proper punching in this program card controls the automatic operations for the corresponding columns of the cards being punched.

The control punching required in the program card depends on the functions to be controlled, that is, skipping, duplicating, and alphabetic punching. Each row in the program card serves a specific purpose in this respect.

Field Definition (12)

Study

Punch a 12 in every column except the first (left-hand position) of every field to be skipped, duplicated, or manually punched. These 12's serve to continue to the end of a field, any skip or duplication started within that field. Treat as a single field several consecutive fields to be automatically skipped or duplicated as one field. Don't program a single-column field with a 12 code.

The 12's punched in the program card for manually punched fields permit occasional skipping or duplicating. This skipping or duplicating is started by key and is carried across the field by the 12's. This type of skipping is similar to an X-level skip on other IBM card punches; the occasional duplicating may be desired in the case of two or more cards with the same information, or in the duplication of the correct fields of an error card.

Automatic Skip (11)

Study

An 11 punched in the first column of any field automatically starts a skip, which is continued over that field by the 12's punched in the remaining columns of the field. If a single column is to be automatically skipped, punch it with an 11. This coding operates with the automatic-skip-and-duplicate switch, which must be on to start the skipping automatically.

Automatic Duplication (0)

A zero punched in the first column of any field automatically starts duplication, which is continued over that field by the 12's punched in the remaining columns of the field. If a single column is to be automatically duplicated, punch it with a zero. This coding operates with the automatic-skip-and-duplicate switch, which must be on to start the duplicating automatically.

Alphabetic Shift (1)

When the program card is in the machine, the combination keyboard is normally in numeric shift, and pressing any one of the 2-purpose keys causes a figure to be punched. To punch a letter, the combination keyboard must be shifted for alphabetic punching. This shifting is performed automatically by a 1 in the program card in each column of the alphabetic field. During duplication of alphabetic information, the 1's permit automatic spacing over blank columns and prevent X-skipping caused by letters containing X-punches (J through R).

On a numeric machine, the only function of the 1's is to permit automatic spacing over blank columns when duplicating.

Program Card Codes

Read

The four basic program codes are summarized here and are illustrated in Figure 9. Two additional codes, which control printing features of the IBM 26, are also listed here and are explained under IBM *26 Printing Features.*

Learn

Code	*Function*
12	Field Definition 4
11	Start Automatic Skip 5
0	Start Automatic Duplication 6
1	Alphabetic Shift 7
2	Left Zero Print
3	Print Suppression

The other digit rows, in the program card, control functions with the alternate program feature. (See *Special Features.*)

Program Drum

Read

The program card is mounted on a program drum for insertion in the machine. The program drum has a clamping strip to hold the card, and a handle on the top to tighten or release the strip. To fasten a card around the drum (Figure 10):

1. Hold the drum in a horizontal position with the handle to the right. Turn the handle away (counter-clockwise direction) as far as it will go. This loosens the smooth edge of the clamping strip.
2. Insert the column-80 edge of the card under the smooth edge of the clamping strip. Two alignment check holes in the clamping strip make it possible to see that the card is flush with the metal edge under the strip. The card should be positioned so that the 9's edge is against the rim of the drum.

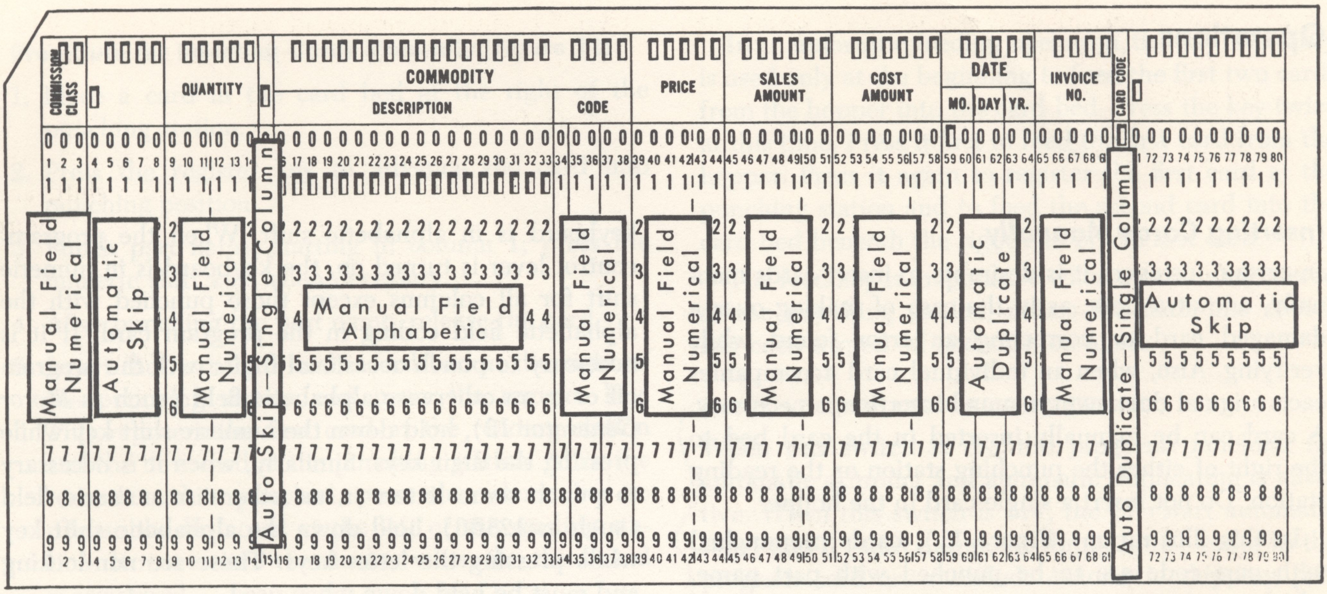
COMMISSION CLASS
QUANTITY
COMMODITY
DESCRIPTION
CODE
PRICE
SALES AMOUNT
COST AMOUNT
DATE
MO.
DAY
YR.
INVOICE NO.
CARD CODE
Manual Field Numerical
Automatic Skip
Manual Field Numerical
Auto Skip—Single Column
Manual Field Alphabetic
Manual Field Numerical
Manual Field Numerical
Manual Field Numerical
Manual Field Numerical
Automatic Duplicate
Manual Field Numerical
Auto Duplicate—Single Column
Automatic Skip

Figure 9. Program Card

3. Turn the handle to the center position. This tightens the smooth edge of the clamping strip and loosens the toothed edge.
4. Wrap the card tightly around the drum and insert the column-1 edge under the toothed edge of the clamping strip.
5. Turn the handle toward you (clockwise direction) as far as it will go. This fastens the toothed edge of the clamping strip. The drum is now ready to be inserted in the machine.

To remove a card from the drum, reverse the procedure.

With the program sensing mechanism raised, place the drum on the spindle under the center cover of the punch, positioned so that the aligning pin falls in the aligning hole in the column-indicator dial. Turn on the program-control lever to lower the reading star wheels onto the program card, and press the release key to engage the reading mechanism fully. Whenever the drum is to be removed, first turn off the program-control lever to raise the star wheels.

To keep the program card for each punching application on a drum ready for insertion in the machine, order extra drums.

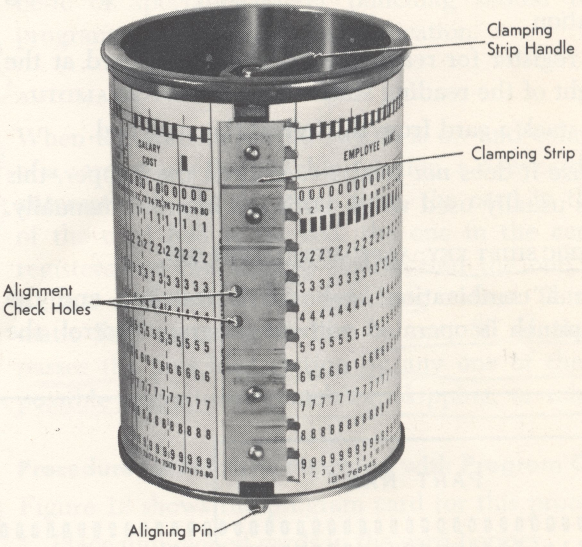
Clamping Strip Handle
Clamping Strip
Alignment Check Holes
Aligning Pin

Figure 10. Program Drum

Inserting Cards Manually

In certain instances it is desirable to insert cards manually, one at a time, as in the case of making over a damaged card or correcting an error found while verifying. Also, when an individual card accompanies each original document, manual insertion is necessary. A card can be manually inserted in the card bed to the right of either the punching station or the reading station. Do not insert a single card in the hopper.

In this illustration (Figure 11), cards prepunched with part code are to be punched with part name, which is written on an accompanying ticket.

REGISTER KEY

Press this key:

1. to register (advance into position) for punching column 1 of the card at the right of the punching station
2. to register for reading column 1 of the card at the right of the reading station
3. to stack a card from the left of the card bed.

Because it does *not* feed a card from the hopper, this key is usually used when cards are inserted manually.

NUMERIC SHIFT KEY; ALPHABETIC SHIFT KEY

Read

When a combination keyboard is installed and the card punch is operated without program control, the keyboard is in alphabetic shift. When the program-control lever is turned on, the keyboard is in numeric shift for all columns except those punched with the alphabetic field coding in the program card. If it is necessary to punch occasional digits with the program off or in an otherwise alphabetic field (such as *Motor Generator 12*), hold down the numeric shift key while pressing the digit keys. Similarly, when it is necessary to punch some letters in an otherwise numeric field (such as 123B6), hold down the alphabetic shift key while pressing the letter keys. These are non-locking and must be held down when used.

When duplicating, press the alphabetic shift key to permit automatic spacing over blank columns and to prevent skipping caused by X-punching.

RELEASE KEY

Press the release key to advance the cards registered at the punching and reading stations past those stations. When the operator releases a card because of an error, common information in fields beyond the release column is preserved. With program control ON, the card punch automatically punches the fields programmed for automatic duplication. Thus, a card can be released at any time without losing master-card information.

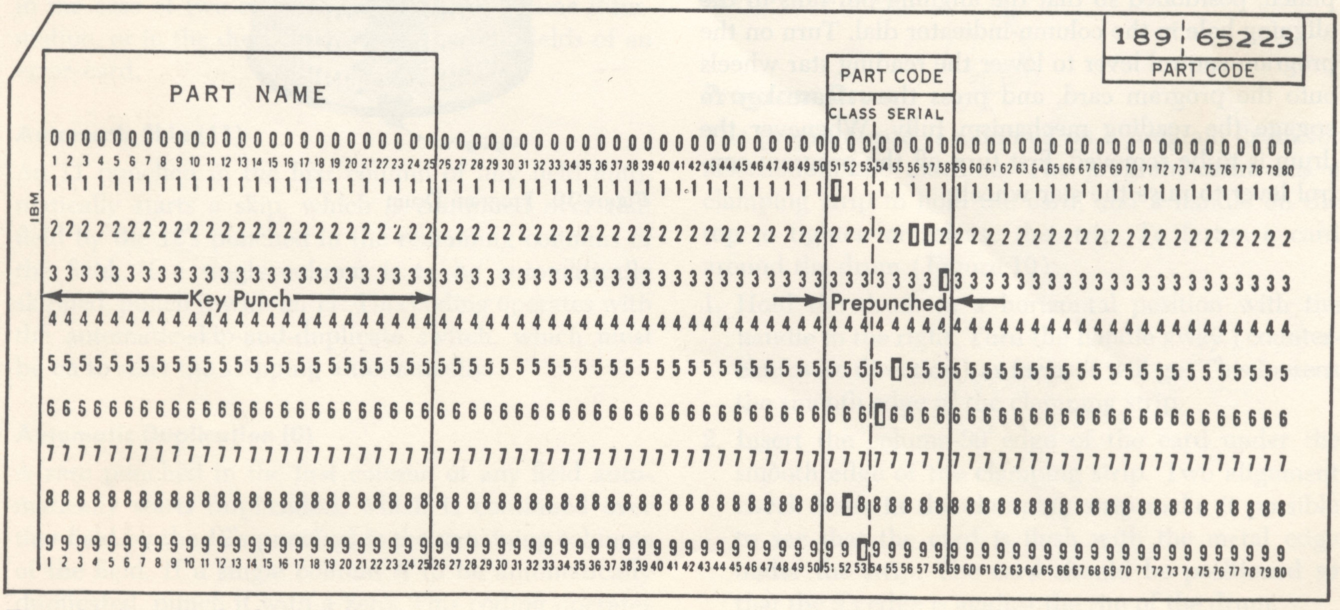

Figure 11. Inserting Cards Manually

Procedure for Inserting Cards Manually (Figure 11)

1. Place a card in the card bed at the right of the punching station.
2. Press the register key to advance the card into punching position.
3. Punch part name, starting in column 1; press the numeric shift key when necessary.
4. After punching the part name, release the card.
5. Insert the next card in the card bed at the right of the punching station and press the register key. This registers the first card at the reading station and the new card at the punching station. After the second card is punched, press the release key to release the first card at the left of the reading station. It moves into the stacker when the third card is registered.

Numeric Punching with Program Control

Usually, in a punching operation, the cards are in the card hopper and feed into the card bed automatically. Also, as the cards are punched, the program card controls the automatic functions such as skipping and duplicating.

In this illustration, labor distribution cards are to be punched with numeric information according to the fields shown. Figure 12 shows how the card is punched to serve as a program card, indicating the type of operation to be performed in each field. Columns 3-6 and 34 and 35 are to be automatically duplicated; columns 48-80 are to be automatically skipped; all other fields are to be keypunched.

FEED KEY

Press this key:

1. to feed a card from the hopper to the card bed
2. to register a card at the punching station
3. to register a card at the reading station
4. to stack a card.

In an automatic feeding operation, this key ordinarily is used only at the beginning to feed the first two cards from the hopper into the card bed. Press the key twice at this time. Press it first to feed the first card from the hopper. Press it again to register the first card at the punching station and to feed the second card into the card bed beneath the right end of the first card.

The feed key is inoperative when a card is registered at the punching station, unless the main-line switch has been turned off and then on again.

AUTOMATIC SKIP AND DUPLICATE SWITCH

When this switch is ON, the program punching for automatic skipping and automatic duplicating is effective. When this switch is OFF, the 11 (start automatic skip) and 0 (start automatic duplication) codes in the program card are nullified. Automatic skipping proceeds at the rate of 80 columns per second; automatic duplicating, at 20 columns per second (IBM 24), and 18 columns per second (IBM 26).

On the IBM 26 Printing Card Punch, multiple-punched columns that deviate from standard alphabetic or special-character punching should not be programmed for automatic duplication.

AUTOMATIC-FEED SWITCH

When the automatic-feed switch is ON and column 80 of a card passes the punching station, a new card feeds automatically. At the same time, the card in the left of the card bed is stacked, the one in the center is registered at the reading station, and the one at the right is registered at the punching station. This automatic feeding occurs when column 80 of the card passes the punching station by any one of the three possible operations—punching, skipping, or releasing.

Procedure for Numeric Punching with Program Control

Figure 12 shows the program card for this procedure:

1. Place unpunched cards in the card hopper.
2. Press the feed key twice to feed two cards into the card bed. The first card registers automatically as the second card feeds.

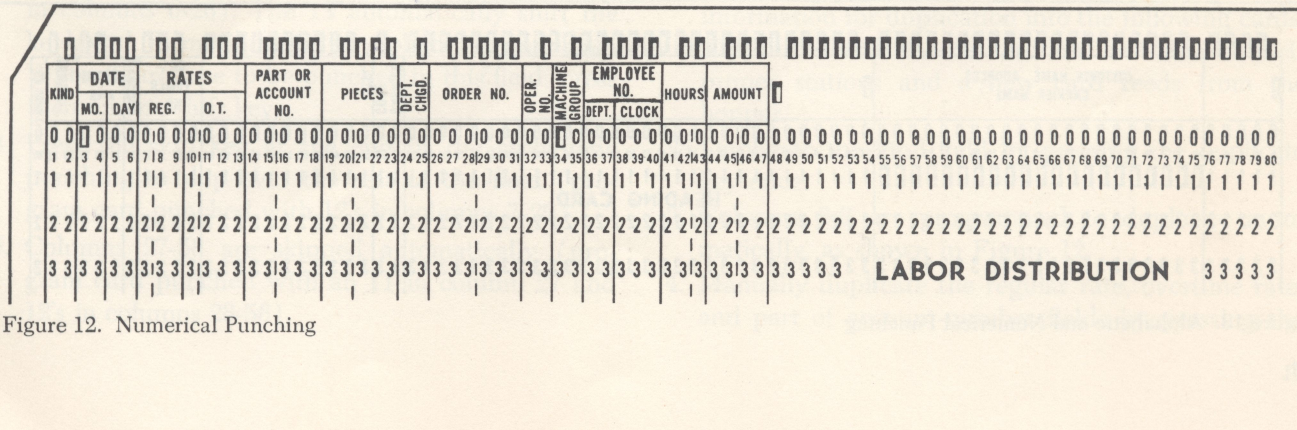

Figure 12. Numerical Punching

3. Keypunch columns 1 and 2 (program card punched with a 12 in column 2).
4. Columns 3-6 are programmed for automatic duplication (program card punched with a 0 in column 3 and 12's in columns 4-6). Key manually the first card of each date group with the automatic-duplicate switch OFF. Then, turn on the switch and the date in each succeeding card is automatically duplicated from the preceding card. Thus, no card handling is necessary even for changes in information being automatically duplicated.
5. Keypunch columns 7-33 (program card punched with a 12 in each column except the first position of each field).
6. Columns 34 and 35 are programmed for automatic duplication (program card punched with a 0 in column 34, and 12 in column 35). In the same manner as date in columns 3-6, key manually the machine group for the first card of each group and it is automatically duplicated in other cards.
7. Keypunch columns 36-47 (program card punched with a 12 in each column except the first position of each field).
8. The card punch automatically skips columns 48-80 (program card punched with an 11 in column 48, and 12's in columns 49-80). The automatic skip and duplicate switch must be ON.
9. With the automatic-feed switch ON, an automatic feed occurs after column 80 is skipped.

Alphabetic and Numeric Punching with Program Control

Although the keyboard is normally in numeric shift when the program is turned on, alphabetic information can be punched by changing to alphabetic shift. This is done either manually by pressing the alphabetic-shift key or automatically by coding in the program card. Columns 6-26 of Figure 13 illustrate the *1* coding for the automatic shift to alphabetic position. If a field is to be punched with both alphabetic and numeric characters, program it for whichever are more frequent; if there is about an equal number of each, program the field for alphabetic punching.

In punching alphabetic names or descriptions that vary in length, it is usually desirable to skip over that part of the field, at the right, which is not used. In this illustration, a portion of the name field should be skipped on most cards. Because the starting point of this skipping varies from card to card, it must be controlled manually by pressing the skip key.

Another type of skipping that must be controlled by key is illustrated in the trading-area field. The trading-area code is to be punched for some customers but not for others. In the latter case, column 75 is to be X-punched to indicate that no code was supplied, and the rest of the field is to be skipped. The 11-punch is used for control in later operations.

When a field is to be punched with the same information in a few successive cards, only the first card must be manually punched; the field in the following cards can be punched by pressing a *single* key. In this illustration, salesman number in columns 78 and 79 may be the same for several consecutive cards and can be duplicated by key.

SKIP KEY

Press this key to skip any field coded with 12's in the program card. Pressing the key starts the skip, and the 12's in succeeding columns of the field continue the skip for the rest of the field. This key is primarily for skipping the unused right-hand portion of an alphabetic field. The card punch skips 80 columns per second.

Numeric fields skipped with this key are blank and cannot be duplicated later, as in correcting punching errors.

DASH SKIP (OR) DASH KEY

When the keyboard is in numeric shift (—SKIP), pressing this key punches an 11 and causes skipping for the rest of the field as determined by the successive columns punched 12 in the program card. This skipping is at the rate of 80 columns per second. When the

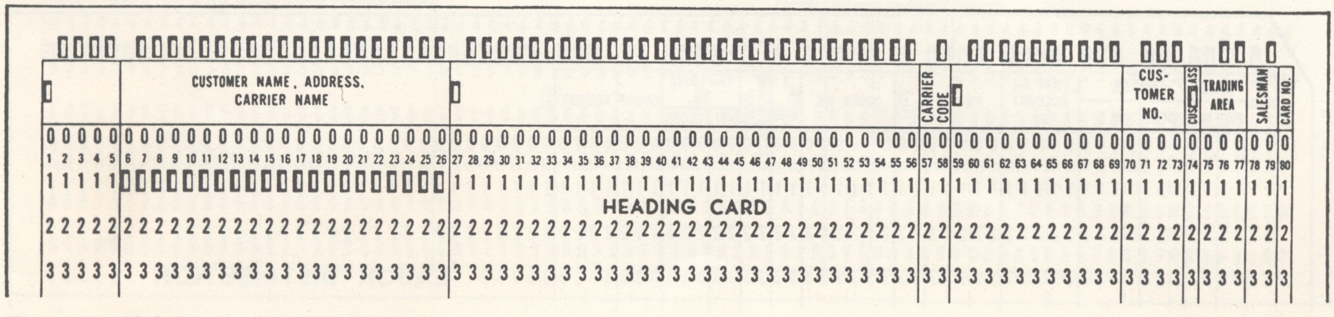

Figure 13. Alphabetic and Numerical Punching

keyboard is in alphabetic shift (—), pressing this key punches an 11, but does not cause skipping. The 11-hole can be used for special character (—) printing.

Numeric fields skipped with this key can be duplicated later in card correction because the duplication of the X causes the rest of the field to be skipped.

DUPLICATE KEY

Use this key to duplicate any information manually punched in one card and common to one or more successive cards. Pressing this key at the beginning of a field starts duplication, and the 12's punched in the program card continue the duplication for the rest of the field.

With program control, duplication is at the rate of 18 or 20 columns per second; without program control, duplication is at the rate of 9 or 10 columns per second and occurs only as long as the key is held down. This latter type of duplication permits the operator to have precise column control and is used in re-punching damaged cards or correcting errors found during a verifying operation.

Pressing this key for the duplication of blank columns in a field programmed for numeric punching should not be attempted because it locks the keyboard. Unlock the keyboard by pressing the backspace key or the alphabetic-shift key on a combination keyboard.

With the IBM 26 Printing Card Punch, do not duplicate multiple-punched columns that deviate from standard alphabetic or special-character punching.

Procedure for Alphabetic and Numeric Punching with Program Control

Figure 13 shows the program card for this procedure:

Read over

1. Place a deck of unpunched cards in the card hopper, and press the feed key twice to feed two cards.
2. The card punch automatically skips columns 1-5 (program card punched with an 11 in column 1 and 12's in columns 2-5). The automatic skip and duplicate switch must be on.
3. Punch columns 6-26 with customer name, address, or carrier name (program card punched with 1's in columns 6-26). The 1's automatically shift the keyboard from numeric to alphabetic punching. When figures are to be punched in this field, press the numeric-shift key.
4. Press the skip key at the end of the alphabetic punching to skip over the rest of the field (program card punched with 12's in columns 7-26).
5. Columns 27-56 are skipped automatically (program card punched with an 11 in column 27 and 12's in columns 28-56).
6. Keypunch carrier code in columns 57 and 58 (program card punched with a 12 in column 58).
7. Columns 59-69 are skipped automatically (program card punched with an 11 in column 59 and 12's in columns 60-69).
8. Keypunch customer number in columns 70-73 (program card punched with 12's in columns 71-73).
9. Column 74 is skipped automatically (program card punched with an 11).
10. The trading-area field in columns 75-77 is coded in the program card for manual numeric punching (blank in column 75 and 12's in columns 76 and 77). Optional X-skipping of the field is controlled by pressing the dash-skip key, which also punches an 11 in column 75.
11. Keypunch columns 78 and 79. Salesman number is frequently the same for several successive cards. After keypunching the first card, duplicate the following ones by pressing the duplicate key in column 78.
12. Keypunch column 80, after which the next card feeds automatically. The automatic-feed switch must be on.

Error Correction

Read over

Errors in punching are often noticed and corrected by the operator at the time they are made. Usually this involves re-keying a large portion of the card. This card punch reduces re-keying to a minimum, requires no concern about the precise column in which the error occurred, minimizes the possibility of making another error while correcting the first, and practically eliminates card handling. As an example, the correction of an error in the pieces field of the labor distribution card (Figure 14) is made as follows:

1. Press the release key immediately upon detecting the error. This advances the card without punching the fields coded for manual punching, but allows duplication of the fields programmed for automatic duplication beyond the point of release. Therefore, columns 34 and 35 are duplicated into the error card as it is being released. This retains the common information for duplication into the following cards. The three cards in the card bed advance to their proper stations and a new card feeds from the hopper.
2. Duplicate the kind field by pressing the duplicate key once.
3. Columns 3-6 are programmed to duplicate automatically, as shown in Figure 12.
4. Manually duplicate the regular rate, overtime rate, and part of account-number fields by pressing the

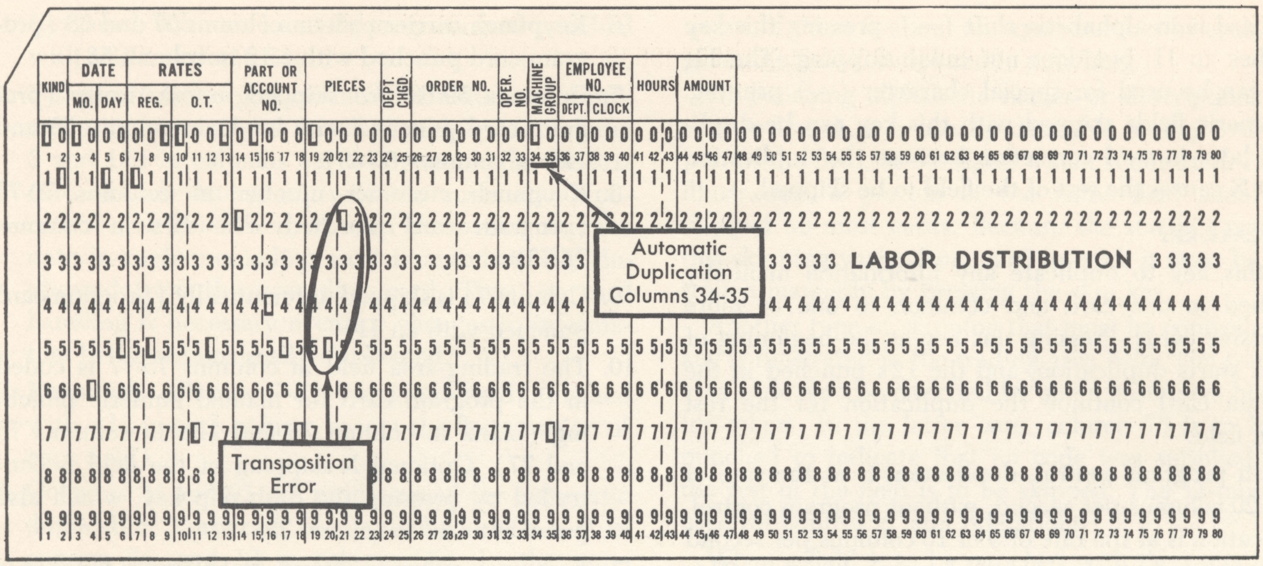

Figure 14. Error Correction

duplicate key at the beginning of each field. Duplication stops at the end of the part or account-number field.

5. Re-key the pieces field, and manually punch the remaining fields programmed for manual punching. Machine group is automatically duplicated, and columns 48-80 are automatically skipped.
6. Remove the error card from the stacker.

Error Correction—Partially Prepunched Cards

Partially prepunched cards may contain prepunched names or codes, or they may be serially numbered and punched. When an error is made in punching cards of this type and the correction is to be made immediately, automatic feeding from the hopper must be interrupted and a blank card must be inserted manually in the card bed. Because each card feeding from the hopper contains some prepunched data, it is not possible to duplicate into the following card as outlined in *Error Correction*.

The commodity card in Figure 15 illustrates a partially prepunched card for which the punching is to be completed. The commission class, commodity description, commodity code, and price fields are prepunched; the remainder of the card is to be keypunched. The commodity code and description are interpreted for pulling from a file. If an error is made in the keying of column 14 (salesman field), make the correction this way:

1. Turn off the automatic-feed switch. This prevents feeding a card from the hopper and registering the card from the right of the card bed when the error card is released.
2. Press the release key. The error card advances past the punching station without punching, except for the date field (columns 70-75), which is programmed for automatic duplication. The duplication of this field retains the date for duplication into the correction card.
3. Turn off the automatic-skip and duplicate switch to prevent automatic skipping during the correction of the error card. The prepunched fields are programmed for automatic skipping, but when correcting an error these fields must be manually duplicated into the blank card.
4. Remove the card following the error card from the right of the card bed.
5. Insert a blank card in the right of the card bed.
6. Press the register key to register the error card at the reading station and the blank card at the punching station. This also stacks the card from the left of the card bed.
7. Manually duplicate the invoice number, branch, and customer number fields, which were punched correctly, by pressing the duplicate key at the beginning of each field.
8. Re-key the salesman field.
9. Manually duplicate the commission class, commodity description, commodity code, and price fields by pressing the duplicate key in column 16. These fields are programmed as one field, for automatic skipping in the regular punching opera-

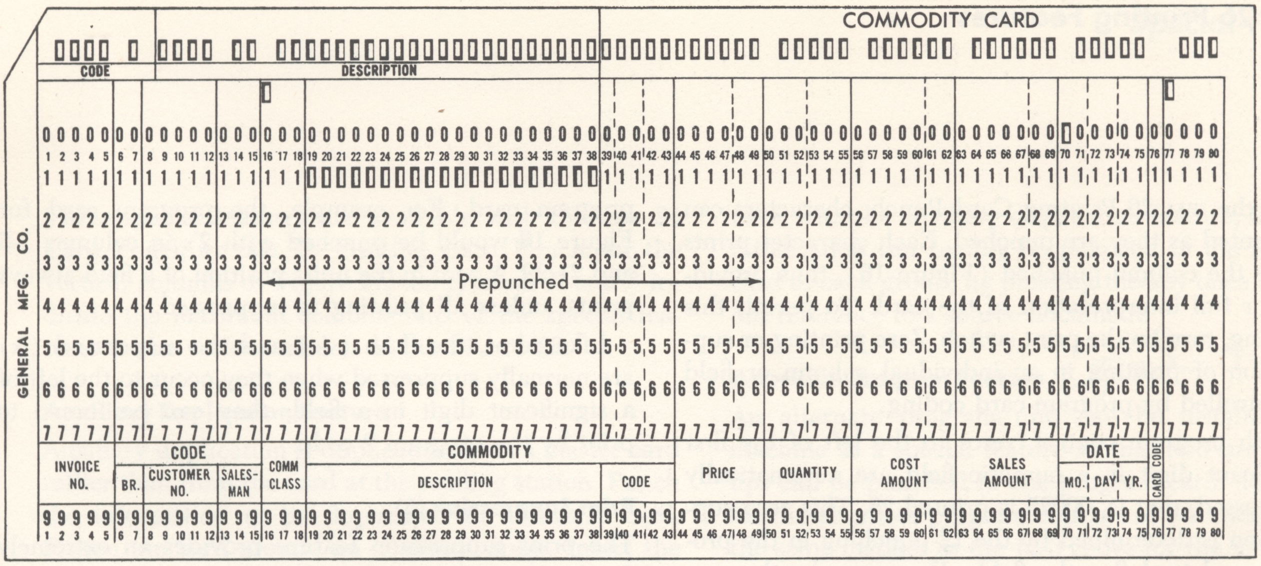

Figure 15. Error Correction—Partially Prepunched Cards

tion. The commodity description field is coded with 1's in the program card to permit automatic spacing over blank columns during the correction of errors made in the punching operation.

10. Turn on the automatic-skip and duplicate switch for the automatic duplication of date and the automatic skipping of the last four columns.
11. Manually punch the remaining fields programmed for manual punching. The date is duplicated automatically and columns 77-80 are skipped automatically.
12. Replace, in the right of the card bed, the card removed in step 4.
13. Press the feed key to register the correction card at the reading station and the replaced card at the punching station. This feeds the next card from the hopper, and stacks the error card.
14. Remove the error card from the stacker.
15. Turn on the automatic-feed switch and continue the operation.

Stop

Prepunched Master Card Insertion

In an operation in which certain fields are to be duplicated from prepunched master cards, it is necessary to insert each master card manually before duplicating the first card of the group. Insert the master cards in the card bed at the right of the reading station.

1. Turn off the automatic-feed switch before completing the punching of the last card of the preceeding group.
2. After the last card is released from the punching station, manually move it to the left until it touches the feed rolls at the reading station.
3. While still maintaining a slight pressure on the card against the feed rolls, press the release key to advance that card past the reading station.
4. Place the master card in the card bed between the punching and reading stations. Position it so that the left edge is just between the feed rolls and not in registered position.
5. Press the feed key to register the master card and the detail card which is at the right in the card bed, and to feed a new card from the hopper. Turn on the automatic-feed switch. Normal punching of the first card of the new group can then proceed, with automatic feeding of the following detail cards.
6. If the master card is not to be stacked with the detail cards, remove it immediately after completion of the punching of the first detail card.
7. This kind of operation normally precludes the possibility of automatic duplication of any common information (such as date) from one group of cards to the next, because the continuity of such duplication is interrupted by insertion of the prepunched master cards. Consequently, when common punching is required, the information must be manually punched in the first card of each new group. This keying can be avoided by use of the auxiliary duplication feature. (See *Special Features.*)

IBM 26 Printing Features

With the IBM 26 Printing Card Punch, characters can be printed as they are punched. Each character prints above the column punched (Figure 16), thus providing for full interpretation of the card. To permit this printing, turn on the print switch. Zero printing or suppression of printing in an individual column or field is controlled by program-card coding.

With program control, zeros to the left of the first significant digit in a numeric field are automatically suppressed, that is, 00025 is printed 25. This zero suppression is determined by the 12-punching in the program card to define the fields. For example, the program card for Figure 16 would be punched with 12 in columns 77 and 79, but blank in 76 and 78, to print *month* and *day* as shown.

Left Zero Print (2)

To print zeros to the left in a field, as in Social Security Number, punch a 2 in each column of the field in the program card. For example, the program card for Figure 16 would be punched with 2's in columns 1-5 and 21-29. A zero in the units position of a field always prints, unless all printing is suppressed.

Like zeros, the dash (—) and the ampersand (&) are normally suppressed when they occur to the left of a significant digit in a field; they can be forced to print by the program 2 code.

Print Suppression (3)

The print suppression feature provides an extremely flexible control of printing. That is, even though the print switch is on, printing can be prevented for one or more columns of the card. Print suppression for a column is controlled by a 3 punched in the program card. To suppress printing for a field, punch a 3 for each column of the field. For example, the program card for Figure 16 would be punched with 3's in columns 34-40.

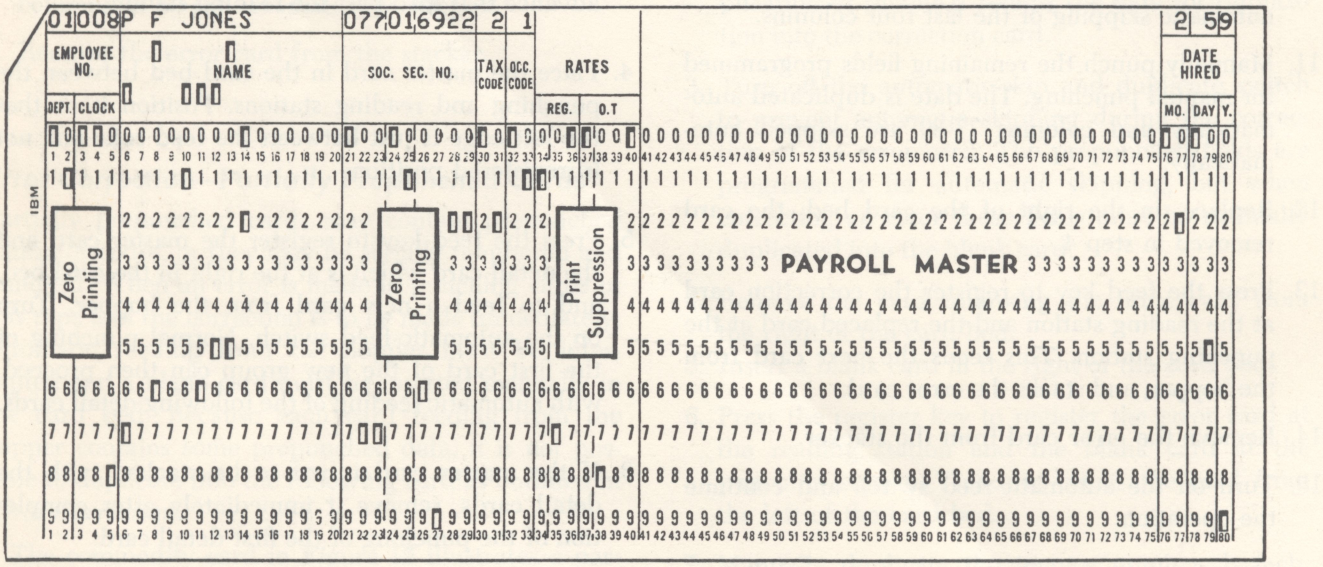

Figure 16. Character Printing

These special features are available with the IBM 24 Card Punch or IBM 26 Printing Card Punch. In the vertical columns of Figure 17, the symbols X and * indicate the maximum combinations of the special features in the various models of the 24 and 26.

Auxiliary Duplication Feature

Auxiliary duplication is duplication from a master card rather than from the card at the reading station. Punch the information to be duplicated in a master card. Fasten the card around an auxiliary drum. Insert the drum in the machine on a spindle in back of the program drum.

An auxiliary duplicate key manually controls auxiliary duplication. Pressing this key starts auxiliary duplication, which continues to the end of the field as defined by 12-punches in the program card. The information in the master card must be in the same columns defined for duplication by the program card.

This type of duplication is advantageous when common information is required for certain cards but not for others, when major-minor duplicating is performed, or when prepunched master cards are inserted. In the case of major-minor duplicating, the major data may be dropped when the automatic-skip and duplicate switch is turned off for a change of information in the minor field. When prepunched master cards are used, any information common to all cards (such as date) is dropped when a new master card is inserted. In either case, with the auxiliary duplication feature, the master information can readily be punched in the first detail card of each group, by pressing the key once and without reference to a source document.

Alternate Program Feature

Read over

An alternate program unit can be installed in the machine as a special feature so that two program setups can be punched in one program card. The coding for the alternate program consists of 4-9 codes used in the same manner as the 12-3 codes for the normal program. Both normal and alternate program codes are summarized as follows:

Normal Code	*Function*	*Alternate Code*
12	Field Definition	4
11	Start Auto Skip	5
0	Start Auto Duplication	6
1	Alphabetic Shift	7
2	Left Zero Print	8
3	Print Suppression	9

This feature is especially advantageous when an occasional card requires a different program control. The card may be of a different design or may be a partially prepunched master. The transfer from the normal program to the alternate program, for a complete card or for a part of a card, is controlled by the operator by pressing an alternate program key.

To use the alternate program feature for a complete card, this key may be pressed either before or after

	Model 1 and 2																Model 3 and 4			Model 5 and 6			Model 21 (26 only)				
Alphabetic Field Limit	x																										
Alphabetic Receive																					x	x					
Alternate Program		x	x		x			x	x	x	x							x	x		x	x			x	x	
Auxiliary Duplication		x		x			x	x	x			x	x		*	x											
Card Correction		x	x	x	x		x	x	x	x	x	x	x		x	x											
Card Insertion								x		x		x						x			x						
Card Order - Converting						x																					
Clock Read-in														x													
Post Card Stock Feed - fixed	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x											
Variable Length Feed		x	x	*	x		x								x	x											
High Speed Skip		x	x	x	x		*								x	x									x		
Interspersed Gang Punch									x		x		x						x			x				x	
Large Reading Board	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x									x	x	
Receive Control and/or Punch Switch Control														x													
Self-Checking Number - Modulus 10			x	x			x			x	x	x	x		x	*		x	x		x	x					
Self-Checking Number - Modulus 11					x																						
Self-Checking Number Generator					x																						
Self-Checking Number Punch Elimination			x	x			x			x	x	x	x		x	*		x	x		x	x					
Space Code Generation																					x	x					

*24 Only

NOTE: Switch control of Interspersed Gangpunch (special feature 4714) cannot be installed if Self-Checking Number - Modulus 10 and Self-Checking Number Punch Elimination are both installed.

Figure 17. Combinations of Special Features for the IBM 24/26

the card is registered, depending on the normal program coding in column 1. If column 1 of the normal program is coded for manual punching, the key may be pressed after the card is registered. If column 1 of the normal program is coded for automatic skipping or duplicating, however, this key must be pressed *before* the card is registered. In this case, the automatic-feed switch must be turned off before the preceding card is completely punched. Then pressing the alternate program key, after the preceding card is released, causes transfer to the alternate program and card feeding.

If the first part of a card is punched under normal program control and the remainder is punched under alternate program control, press this key when the alternate program is to be effective.

Pressing the alternate program key makes programming from the alternate program effective for the remainder of that card. When the following card feeds, the normal program again becomes effective.

Do not duplicate program cards punched with both normal and alternate program codes.

Interspersed Gangpunch Feature

This feature recognizes master cards with an upper left or right corner cut. Detail cards must not have the same corner cut as the master cards (and cannot have a lower left cut). Punching is from master card to detail card, or detail card to detail card, never from detail to master or master to master.

When the switch on the keyboard is off, the feature is inoperative. When the switch is on, the feature determines whether a card is a master or a detail depending on the presence or absence of the specified master corner cut. Normal use of the feature requires that the automatic-feed and automatic-duplicating switch be turned on.

Because the feature does not begin to operate until after one card has fed from the feed hopper to the card bed, the first card in the machine is considered a detail card. To feed the first card into position, press the feed key twice as in standard feed operation, and then press the release key once to position a card at the reading station so that duplicating can begin.

Because the purpose of the feature is to suspend punching for a corner-cut master card, programming is the same for detail cards as in any normal card punching operation.

Once duplicating has started, normal operation under control of the program card continues until the feature recognizes a master card. At this time the card preceding the master is at the punching station. The master card stays at the right of the card bed while the preceding card is duplicated. On the next card-feed cycle, the master card passes the punching station at release speed, and all punching and programming is suspended. A master card requires approximately 1.25 seconds to pass to the reading station. If the next card is also a master, the process is repeated. When a detail card feeds, it is under normal control of the program drum, and punching is duplicated from the preceding card.

If required, an additional feature, controlled by a toggle switch, may be installed with the interspersed gangpunch feature. This additional feature allows manual selection of either upper left or right corner-cut master cards in any interspersed gangpunch operation, but not both in the same operation. The switch on the keyboard for the interspersed gangpunching must also be ON for this device to operate.

Card Correction Feature

The card correction procedure for operator-detected keying errors can require considerable additional decision-making and keying by the operator. The IBM card correction feature speeds the correction procedure for operator-detected keying errors on the IBM 24-26 Card Punch.

Upon detecting an error and before keying the next column of information, the operator merely presses the correction key on the keyboard. Essentially, this action moves the error card to the read station and reproduces the information (up to the error column) into a new card at the punch station. The operator then keys in the correct information and resumes normal operation.

When the correction (CORR) key is pressed (see Figure 26), the actual sequence of automatic operation is:

1. An error code (12-11) is punched in the error column. Therefore, when the card correction feature is used, the 12-11 coding cannot be used to designate a special character, or a portion of any such character.
2. The error card is released at 80 columns per second to the read station, and a new card registers at the punch station.

   Note: Any columns programmed for automatic duplication are duplicated at 18 or 20 columns per second during this release operation.
3. The information manually punched into the error card is then automatically reproduced into the new card (up to the error column) at the rate of 9 or 10 columns per second.

   Note: Any columns programmed for automatic duplication are duplicated at 18 or 20 columns per second and any columns programmed for automatic skip are skipped at 80 columns per second.

4. The new card stops in the error column for manual keying of the correct information. Normal operation is then resumed.

PROGRAM CONTROL

With the card correction feature, each manually-punched column must be identified by an 8-punch code in the corresponding column of the program card (Figure 18). This code identifies the columns that must be searched for an error code during any correction operation.

When an error-correction routine is in process, the operator should not press or hold down any key on the keyboard. This could affect the successful completion of the routine. In-process time covers the period between pressing the correction key and stopping the new card at the error column.

The correction feature is not effective for the last column of a manual field that immediately precedes an automatic function. This is because normal punching of the last manual column permits the program control to move into the automatic function area.

Never press the correction key immediately after an automatic function is completed and before manual keying. Should this occur, a continuous error-search routine would result. This improper use of the correction key places the error code in the last column of the automatic field where the 24-26 cannot detect it. To stop the continuous error-search routine, raise the star wheels.

ALTERNATE PROGRAM

The 24-26 with alternate programming uses the 2-punch to identify manual columns for the alternate mode with the card correction feature (Figure 18). The 8-punch is still used to identify manual columns for the standard programming mode. This means that *left zero print* is not available on any IBM 26 with both the alternate programming feature and the card correction feature.

When the 24-26 is in the alternate program mode and the correction key is pressed, the machine continues in this mode until the entire *new* card is completed. This requires that all 80 columns of a program card be fully programmed for both standard and alternate mode even though normal operation might require less than 80 columns of alternate programming. The additional columns of required alternate programming are an exact duplicate of the standard programming for these columns.

All skip fields encountered during an error search operation, while the machine is in the alternate mode, are automatically duplicated to ensure an exact reproduction of the card.

SELF-CHECKING NUMBER, MODULUS 11

The 2-punch (rather than the 8-punch) is used to designate each column to be error checked. Therefore, *left zero print* is not available on any IBM 26 machine with this feature.

PROGRAM CARD PUNCHING

A typical program card for the card correction feature using standard and alternate programming could look like Figure 18.

Note: The 1-, 3-, 6-, and 9-punches are not used in this example. However, they could be used to program their normal functions, if required.

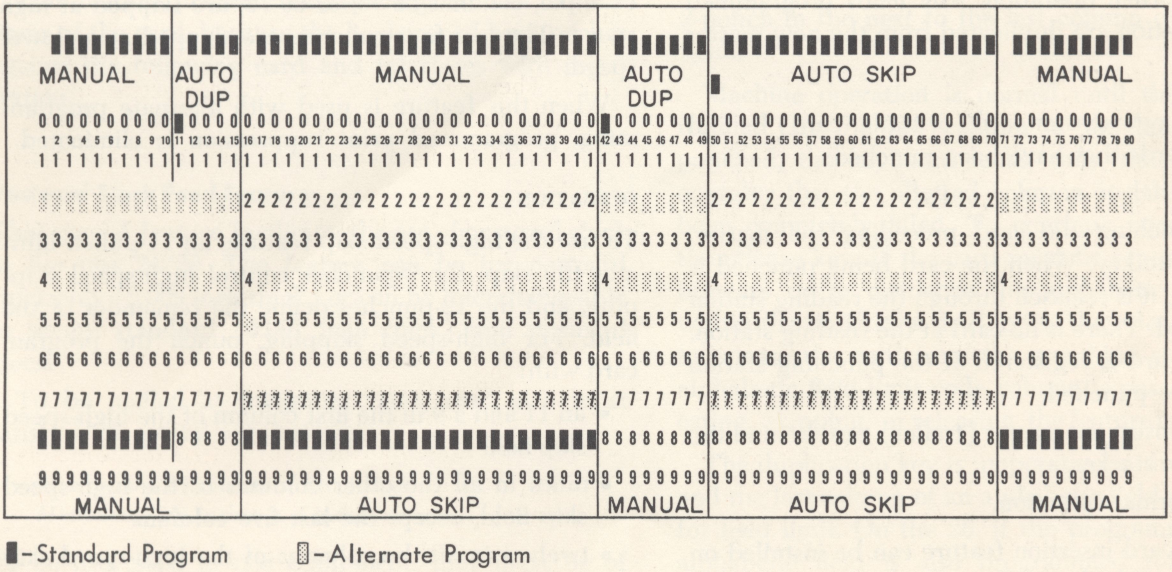

Figure 18. Program Card for Card Correction Feature

Standard Program

12—*Field Definition*
11—*Automatic Skip*
0—*Automatic Duplication*
8—*Manual Field:* The 8-punch *must* appear in each column of *all manual fields* programmed for standard mode. This punch *should not* be used in any field programmed for *automatic duplication* because this would force half-speed duplication of this field during error-correction routines.

Alternate Program

4—*Field Definition*
5—*Automatic Skip*
2—*Manual Field:* The 2-punch *must* appear in each column of *all manual fields* programmed for alternate mode. This punch *should not* be used in any field programmed for *automatic duplication* because this would force half-speed duplication of this field during error-correction routines.

Card Insertion Feature

The card insertion feature simplifies the manual insertion of a master duplicating card in front of a group of cards to be punched, or the insertion of a blank or prepunched trailer card at the end of a group of punched cards.

To insert a new master card in front of a group:

1. Set the card insertion feature switch to INSERT.
2. While punching the card preceding the master card to be inserted, press the MC (master card) key. When the card being punched is completed, it is released through the reading station, but stops before it is stacked. There is no card at the reading station and the next card is registered for punching.
3. Manually insert the new master card in the reading station.
4. Press the feed key to register both the master card at the reading station and the next detail card at the punching station.
5. Resume normal operation. Any fields programmed for duplication are duplicated from the new master card.

To insert a new master card (or trailer card) behind a group of cards that have been punched:

1. Set the switch to STACK.
2. While punching the card preceding the master, press the MC key. When the card being punched is completed, it is released through the reading station and stacked. There is no card at the reading station. The next card is registered at the punching station ready to be punched.
3. Manually insert the master (trailer) card behind the cards in the stacker.
4. Resume normal operation.

Note: The card insertion feature can be installed on any 24 or 26 with the card correction feature. However, once the MC key is pressed, the correction key cannot be used until the master card function is completed.

Self-Checking Number Feature

This feature is described in IBM *24, 26 Card Punch Bulletin Self-Checking Number Feature,* Form G24-1057.

High-Speed Skip Feature

The high-speed skip feature provides the greatest advantage for those applications that require skipping of 55 or more consecutive columns of the card. It is available for factory or field installation on the 24 or 26.

This is a program-controlled high-speed skip operating with standard skipping. High-speed skipping is accomplished at the rate of approximately three times the standard skip speed and results in a saving of eight milliseconds per column skipped at high speed. In the example (Figure 19) if 66 columns are skipped, 62 columns are skipped at high speed with a saving of a half-second per card. The sensing mechanism is positioned in such a way that five columns at the end of the field have to be reserved for drop-out. The controlling 9 not punched in the last five columns of the program card disengages (drops out) the high-speed skip and slows down the skip for the remainder of the card. This is necessary because the high skipping speed must be slowed down to obtain proper registration of the card for punching.

When this feature is installed on machines with the variable-length card feed feature, card output is also increased. The missing portion of these cards, for example, columns 51-76, or 60-76, are skipped at high speed. The last four columns are skipped at a slower speed.

When this feature is used with alternate programming, programmed print suppression is eliminated.

OPERATION

To use the high-speed skip feature, an 11-punch initiates the skip, the 9-punches control high-speed skipping, and the 12-punches define the remainder of the field. For high-speed skipping, punch the program card with:

- an 11 and a 9 in the first column of the high-speed skip field
- nines in all the other columns of the high-speed skip field, except the last five columns
- twelves in all the columns of the high-speed skip field, except the first column.

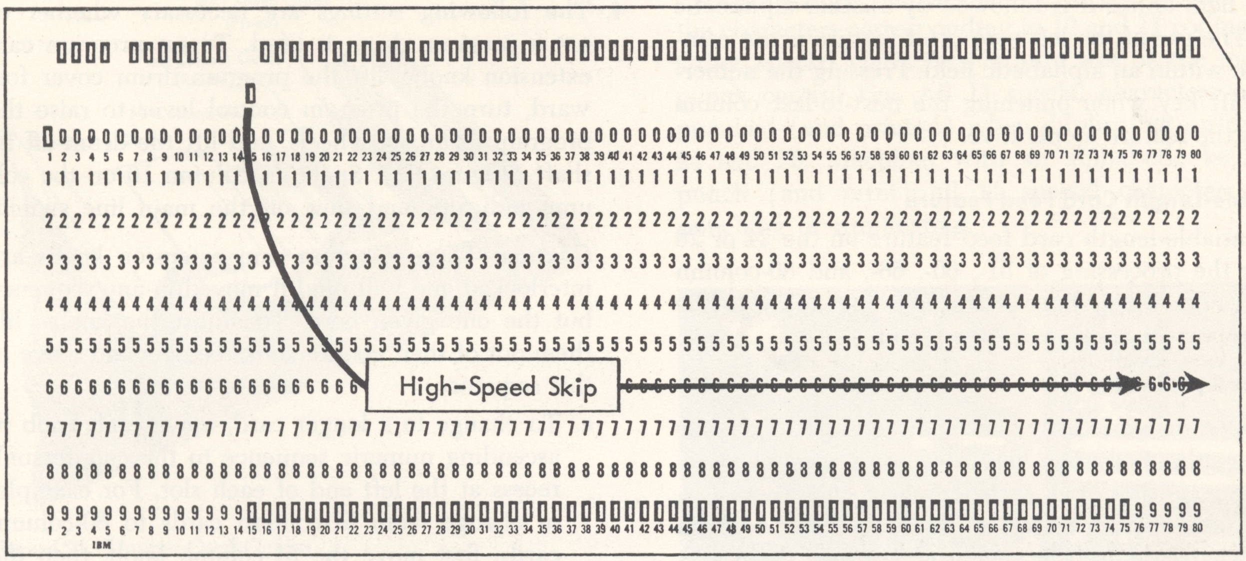

Figure 19. Program Card Showing High-Speed Skip Punching

On machines equipped with the alternate program feature, 9-punches become the non-alternate or normal program, and the 3-punch is used to control the alternate-program high-speed skip.

This feature requires the operator to press the feed key three times to register the first card from the hopper at the punch station. The second card is at the preregistration station; a third card, hidden from sight, has just left the hopper. If at any time during the operation it is necessary to turn the auto-feed switch off to clear the machine of cards, press the release and register keys three times to remove the cards from the punching and reading stations. Also, remove manually the last card, which was hidden, from the preregistration station after the second release.

This feature prevents backspacing the last 16 columns of the card, because the backspaced card pushes against the following card and interferes with registration.

Postcard Stock Feed Feature

This special feature facilitates the use of postcard stock in the IBM 24/26. The feature can be for postcard stock only (0.009 inch thick) or can be interchangeable to accept standard (0.007 inch thick) and postcard stock.

To be mailed at minimum rates, card size must satisfy U. S. postal regulations:

Maximum—3⁹⁄₁₆ inches × 5⁹⁄₁₆ inches
Minimum—2¾ inches × 4 inches

To be processed in IBM equipment, they must be of standard punched-card dimensions and 0.009-inch thick (plus or minus 0.0005 inch). Other factors to be considered in designing cards for postal use include location of punching, scoring, content, and corner cut.

Note: Approval must be secured from local postal authorities for specific card designs.

Alphabetic Field-Limit Feature

The alphabetic field-limit feature defines the limits of a programmed alphabetic field to prevent accidental punching beyond that field.

A 2-punch in the program card controls this feature. This program card is coded in the normal manner for alphabetic punching: a 1-punch in each column and a 12-punch in all but the first column. Punch the 2-punch in the next to the last column of the limited field.

Machine operation is normal until this column is reached. As the last column of the limited field is punched, the keyboard locks, thus indicating to the operator that the allotted columns for that field have been completely filled. To continue operation, press the release key. If the card must be repunched to abbreviate or to condense the alphabetic information within the limits of a field, press the release key again to release the card from the punching station. If the alphabetic field-limit code column is passed by duplicating, skipping, or releasing, the feature is inoperative.

The duplication key is inoperative in the next-to-last and the last column of an alphabetic field programmed for field limit. On the 26, if the programmed, limited alphabetic field is also programmed for print suppression, printing is not suppressed in the last column of the field unless it is followed by another alphabetic field. The use of the left zero print feature is not compatible within an alphabetic field. Pressing the numerical shift key when punching the next-to-last column makes the feature inoperative.

Variable-Length Card Feed Feature

The variable-length card feed feature on the 24 or 26 allows the processing of 51-, 60-, 66-, and 80-column cards (Figure 20). Special features that apply to the 24 or 26 can be used with this feature.

MACHINE SETTINGS

The operator can easily make all settings to change card lengths. Only one length of cards may be processed at one time. For each length of card there is a card guide which is raised on the hopper bed to form a right-hand guide. The operator performs these preliminary steps to process each length of card.

1. Select the proper card guide in the hopper and lift it forward into position. For any selected card length, all card guides for cards of shorter length must rest in the hopper bed (Figure 21). Note that the 80-column card guide is fixed at the right side of the hopper. The sliding pressure plate in the hopper is notched to pass over the raised card guides.
2. Lift the thumb latch and move the card pusher to the proper card-column notch (see Figure 20). A spring guides each card under the card pusher for correct feeding position.
3. Align 51- and 60-column cards to the stacker drum by pulling the stacker stop operating lever toward the front of the machine (see Figure 20). For 66- and 80-column cards, push the lever back.
4. The following settings are necessary whether or not a program drum is used. To set program cam extension knobs, lift the program drum cover forward, turn the program control lever to raise the program drum starwheels, and lift the drum off its shaft (Figure 22). Space to column 16 on the column indicator and turn off the main line switch.

Caution: These program cam extension knobs are interlocked and will bind if moved in any sequence but the one given here. To adjust the knobs, lift them out of their countersunk recesses and move in this sequence:

a. To change to a longer card, move each knob in ascending numeric sequence to the countersunk recess at the left end of each slot. For example, to change from 51-column cards to 80-column cards, first move the 51-column knob, then the 60-column knob, and then the 66-column knob.

b. To change to a shorter card, move each knob in descending numeric sequence to the countersunk recess at the right end of each slot. For example, to change from 80-column cards to 51-column cards, first move the 66-column knob to the right, then the 60-column knob, and then the 51-column knob.

These steps are summarized on a decal inside the program drum cover.

OPERATION

Program cards must only be punched, starting at column 1, with the same number of columns that are in the cards to be processed. However, if the machine is equipped with a high-speed skip feature, high-speed skip can be programmed beyond the number of col-

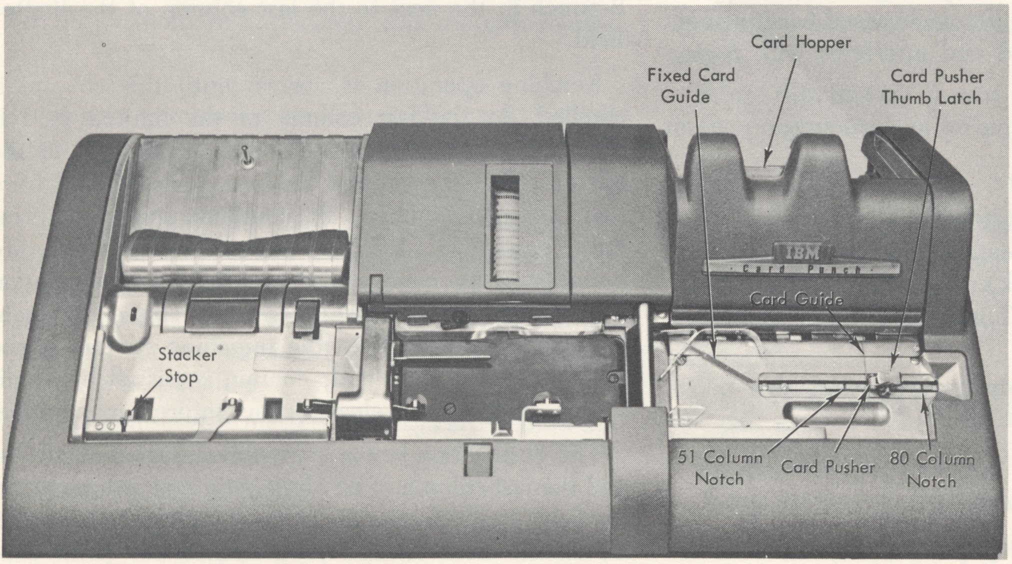

Figure 20. Variable-Length Card Feed Device

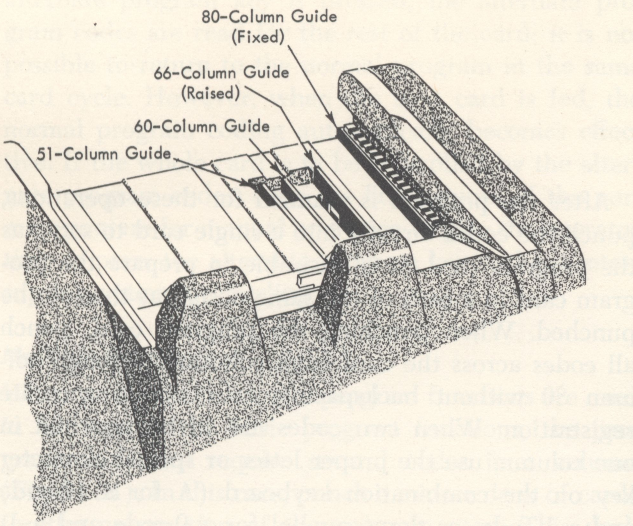
80-Column Guide (Fixed)
66-Column Guide (Raised)
60-Column Guide
51-Column Guide

Figure 21. Hopper Card Guides

umns in the cards being processed to obtain the maximum benefits of this feature. Otherwise, program card preparation is the same as for 80-column cards.

Any length card can be manually inserted if the card pusher is positioned for that length. The right end of each card must rest against the card pusher.

Do not backspace within the last 16 columns of all cards, because the backspace card would push against the following card and interfere with registration.

Special-Character Arrangements

The arrangements in Figure 23 are available for the punching (and printing) of special characters. Card punches with a numeric keyboard punch (and print) the characters corresponding to 12 and 11 coding only. Other special characters require use of the multiple punch control key. All 11 special characters can be punched (and printed) when duplicating on the IBM 24 and 26. Machines with an alphabetic keyboard, punch (and print) all 11 special characters when punching or duplicating.

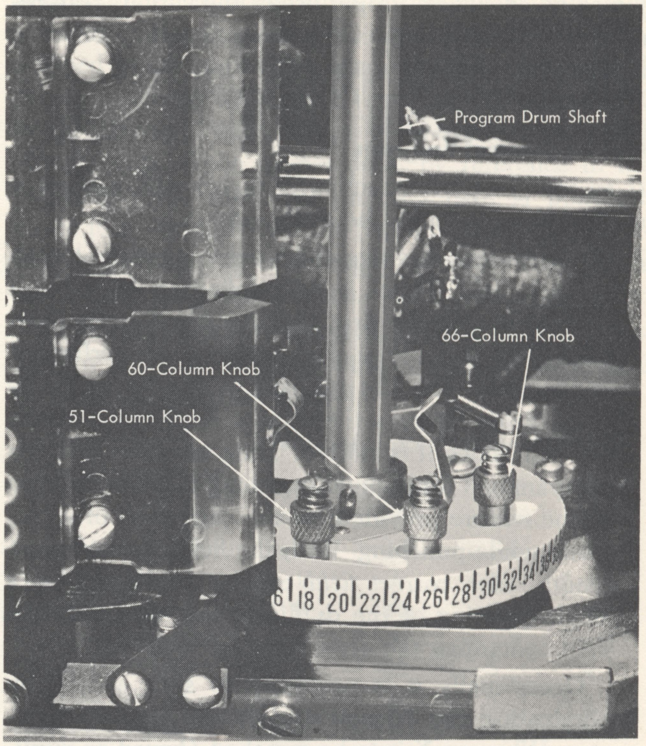
Program Drum Shaft
66-Column Knob
60-Column Knob
51-Column Knob
6
18
20
22
24
26
28
30
32
34
36

Figure 22. Program Cam Extension Knobs (80-Column Card Setting)

Arrangement	IBM Card Code										
	12	12-3-8	12-4-8	11	11-3-8	11-4-8	0-3-8	0-4-8	0-1	3-8	4-8
A	&	.	⌑	-	$	*	,	%	/	#	@
B	/	.	⌑	-	$	*	,	%	&	#	@
C	&	.	⌑	-	$	*	,	%	0	#	@
D	-	.	⌑	-	$	*	,	%	/	#	@
E	-	.	<	/	.	*	,	%	&	#	>
F	+	.	)	-	$	*	,	(	/	=	-
G	+	.	⌑	-	$	*	,	%	/	+	-
H	+	.	)	-	$	*	,	(	/	=	' (Prime Sign)
J	+	.	⌑	-	$	*	,	%	/	#	@
K	+	.	)	-	$	*	,	(	/	=	@

Figure 23. IBM 24, 26—Special-Character Punching and Printing Arrangements

Program Card Preparation

When a program card is to be prepared for a particular punching application, the card design should be carefully analyzed to code the program card for maximum punching efficiency. Proper use of the various features of the card punch reduces operator time and effort to a minimum.

Learn Read Over

IBM 24, Normal Program

If an IBM 24 Card Punch with no special features is used, the cards should be analyzed for:

1. *field-definition coding,* which determines the length of each field. Punch a field-definition 12 in each column except the first (left-hand) of every field regardless of the type of operation to be performed in that field. The 12's are used in skipped or duplicated fields to carry the skip or duplication across the field, once it is started. They are used in fields programmed for manual punching to make full use of the feature provided for the correction of errors made while punching. With the fields defined as to length, each correct *field* can be duplicated by a single pressing of the duplicate key, and only the *field* containing the error must be re-keyed.

   Occasionally it is necessary to split a field by eliminating the 12-punching in one or more columns. When an X is to be punched (keyed or duplicated) in a numeric field, but skipping must not occur, eliminating this 12 prevents the skipping of the rest of the field (see *X-Punching and Skipping* under *Operating Suggestions*).
2. *automatic skipping* for each field that is not to be punched at this time. If several successive fields are to be skipped on every card, program them as one large field with the X in the first column and 12's in all successive columns.
3. *automatic duplication* of each field that is punched with the same data for a group of cards. If several successive fields are to be duplicated on every card, program them as one large field with the 0 in the first column and 12's in all successive columns.
4. *alphabetic coding* to shift the keyboard when letters are to be keyed. If all, or most, of a field is to be alphabetically punched, code it with 1's and use the numeric shift key for occasional figure punching. In the duplication of alphabetic punching, the 1's permit duplication of blank columns and prevent skipping caused by the X's in the letters J through R.

After the program is planned for these operations, punch the codes directly into a single card to serve as the program card. It is desirable to prepare the program card in a card of the same design as those to be punched. When punching the program card, punch all codes across the card from column 1 through column 80 without backspacing, to maintain accurate registration. When two codes are to be punched in one column, use the proper letter or special character key on the combination keyboard (A for a 12-code and a 1-code, or the / symbol for a 0-code and a 1-code).

Printing Features

If the IBM 26 Printing Card Punch is used, the cards should be analyzed for zero printing and print suppression in addition to the basic functions discussed in the preceding paragraphs.

1. Zeros, dashes, and ampersands to the left of a significant digit in a field are automatically suppressed. This suppression depends on the field-definition coding of 12's in every column *except* the first. Therefore, if several successive fields are to be programmed for automatic duplication but zero suppression is desired, program each field independently for automatic duplication, rather than as one large field as described before.

   Note: A zero always prints in the units position of a field that does not have a significant digit (field with all zeros) unless the units position is programmed for print suppression.

   If zeros (dashes or ampersands) are desired to the left in a field, such as social security number, they must be forced by punching the program card with code 2 in each column in which such printing is to occur.
2. To suppress all printing in a column or columns, punch a 3 in each column of the program card.

Alternate Program

If the alternate program is used to handle two types of cards in one punching operation, analyze all the preceding functions for the alternate program, and punch the proper codes (4-9). Consider the time in the card cycle when the change to the alternate program is to be made. The change can be made at the beginning of the card or whenever in the card cycle it is desirable for the alternate coding to become effective. Once the alternate program key is pressed, the alternate program codes are read for the rest of the card; it is not possible to return to the normal program in the same card cycle. However, when the next card is fed, the normal program coding automatically becomes effective. If the whole card is to be controlled by the alternate program codes, code the first column of the normal program for manual operation to give the operator time to press the alternate program key without interrupting automatic feeding.

Multiple Functions

Read

When printing or alternate program functions are used in addition to the basic program functions, the program card may require several codes in a column (Figure 24). In this case, punch a master deck of cards for the preparation of the program card. This deck consists of a maximum of 12 cards, one for each punching row: one card punched with all the required 12-codes, a second card with all the required 11-codes, a third card with all the required 0-codes, and so on. After the cards of the master deck are punched, duplicate each card, one at a time, into a single card which then becomes the program card. This method of preparing a program card facilitates the preparation of slightly changed or duplicate program cards, because multiple punches other than standard may not be duplicated on the punch.

Program Planning Card

A program planning card, X24-8605, is an aid in the preparation of program cards. This card has 12 rows of column numbers, each row located in a punching position (Figure 25). The program codes, with the function of each, are on the back of the card for reference, and a place is provided for any special notes pertinent to the individual program-card design.

When analyzing the cards to be punched, mark the planning card for the functions to be performed in each column. For example, if column 10 is to be punched with an alphabetic character under normal program control, draw a mark through column 10 in the 1-row; if columns 59-80 are to be automatically skipped under normal program control, draw a mark through column 59 in the 11-row and columns 60-80 in the 12-row. Punch the program card, or the individual cards of the master deck, by reference to the planning card. After the program card is punched, check it by laying it over the planning card. The markings on the planning card should be visible through the punches in the program card.

This chart illustrates the program card coding necessary to perform card-punching operations in normal or alternate program control.

Operation	*Normal Code*		*Alternate Code*	
	First column	*Rest of field*	*First column*	*Rest of field*
Punch Numeric	space	12	space	4
Punch Alphabetic	1	A	7	7 + 4
Duplicate Numeric	0	12	6	4
Duplicate Alphabetic	0 + 1	A	6 + 7	7 + 4
Skip Automatically	X	12	5	4
Left Zero Print	2	B	8	8 + 4
Suppress Printing	3	C	9	9 + 4

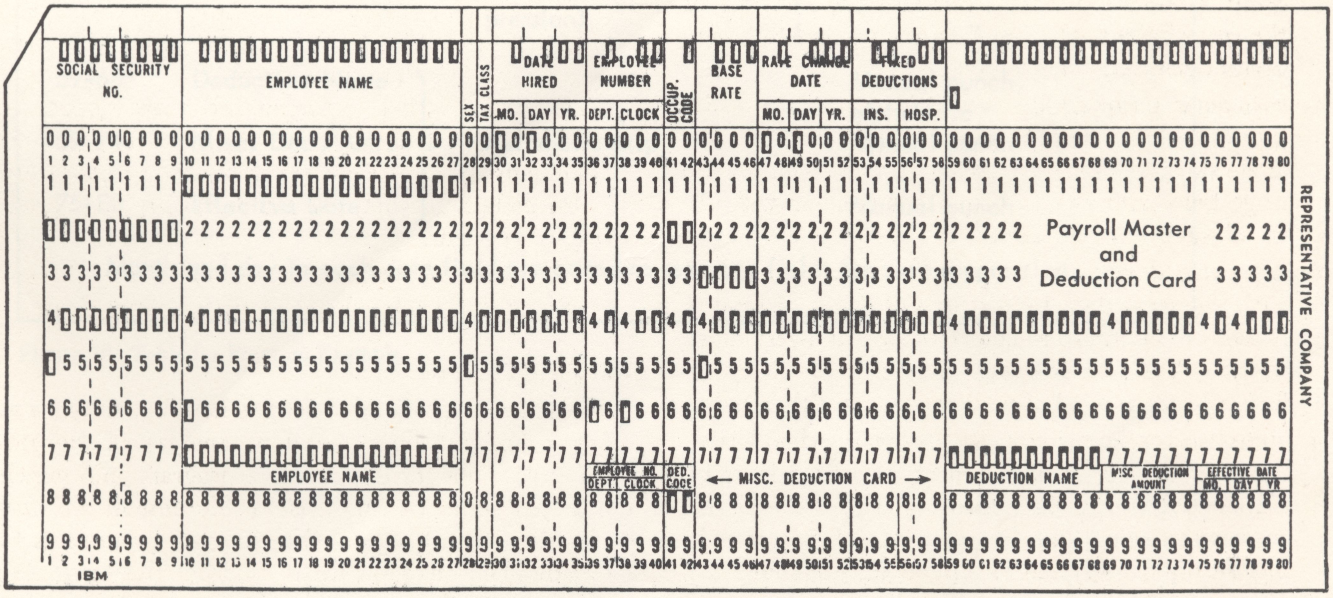
SOCIAL SECURITY NO.
EMPLOYEE NAME
SEX
TAX CLASS
DATE HIRED
MO. DAY YR.
EMPLOYEE NUMBER
DEPT. CLOCK
OCCUP. CODE
BASE RATE
RATE CHANGE DATE
MO. DAY YR.
FIXED DEDUCTIONS
INS. HOSP.
Payroll Master and Deduction Card
EMPLOYEE NAME
EMPLOYEE NO. DEPT. CLOCK
DED. CODE
← MISC. DEDUCTION CARD →
DEDUCTION NAME
MISC DEDUCTION AMOUNT
EFFECTIVE DATE MO. DAY YR.
REPRESENTATIVE COMPANY
IBM

Figure 24. Program Card—Multiple Functions

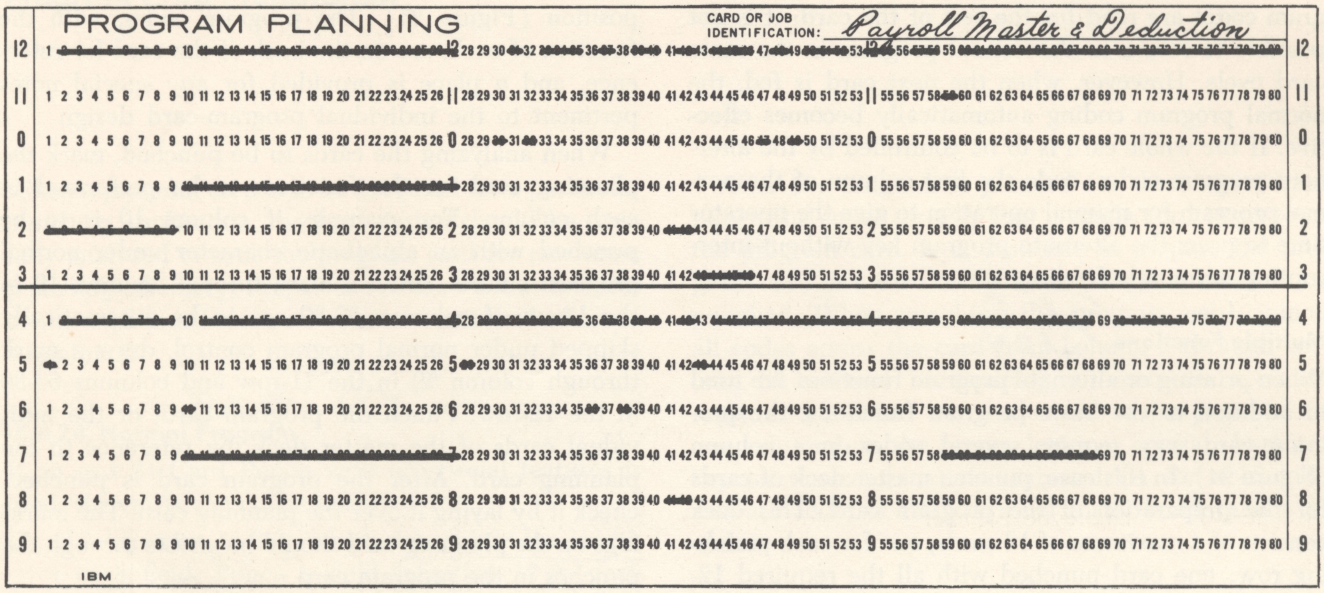

Figure 25. Program Planning Card

Program Example

The functions marked on the card in Figure 25 constitute the program plan for the payroll-master-and-deduction card in Figure 24. The field headings for the payroll-master part of the card are at the top of the card; the headings for the deduction part are between the 7 and 8 punching rows. A payroll master card is prepared for each new employee and is punched under normal program coding. Miscellaneous deduction cards are punched for only those new employees who have deductions other than the fixed deductions, and are punched under alternate program coding. Whenever possible, common information is duplicated from the payroll master cards into the deduction cards. The cards are punched in groups by date hired, and the rate-change date for a new employee is the same as the date hired. The program card is planned and punched as shown in Figure 26.

Columns	Field Heading	Normal Program	Alternate Program
1-9	Social Security No.	Manual punch; print zeros to the left	Automatic skip
10-27	Employee Name	Manual punch, alphabetic	Automatic duplicate, alphabetic
28	Sex	Manual punch	Automatic skip
29	Tax Class	Manual punch	
30-35	Date Hired	Automatic duplicate	
36-40	Employee Number	Manual punch (Dept. and Clock coded as separate fields for error correction and zero suppression)	Automatic duplicate (Dept. and Clock coded as separate fields for zero suppression)
41-42	Occup. Code or Ded. Code	Manual punch; print zeros to the left	Manual punch; print zeros to the left
43-46	Base Rate	Manual punch, suppress printing	Automatic skip
47-52	Rate Change Date	Automatic duplicate	
53-58	Fixed Deductions	Manual punch (Insurance and Hospitalization coded as separate fields for error correction and zero suppression)	
59-68	Deduction Name	Automatic skip	Manual punch, alphabetic
69-74	Misc. Ded. Amt.		Manual punch
75-80	Effective Date		Manual punch

Month and day in each date field are coded as separate fields for zero suppression

Figure 26. Table for Program Example

Operating Suggestions

These suggestions are given as an aid to most efficient operation of the IBM 24 and 26 Card Punches.

Starting a Punching Operation

Read

When a new job is started, the release key should be pressed (but need not be held) after the main-line switch is turned on. After a short delay, a release cycle occurs, indicating that operation can be started. Then, press the feed key twice to register the first card if the automatic feed switch is off. If the switch is on, press the feed key only once. If a prepunched master card is to be inserted, place it in the center of the card bed after the first feed cycle.

When master information for automatic duplication is to be keyed in the first card of the group, turn off the automatic skip and duplicate switch before the first card is registered, and leave it OFF until the master information is keyed. On this first card, use the skip key to skip the fields programmed for automatic skipping.

Engaging the Program Reading Mechanism

Turning the program control lever to lower the starwheels may not fully engage the reading mechanism. Therefore, it is necessary also to press the release key. For this reason, once the program is turned on leave it ON, and whenever possible any temporary changes or interruptions in the punching routine should be handled by the functional switches and keys.

Stopping a Punching Operation

When an operation is to be stopped and the main-line switch is to be turned off before a batch of work is completed (as at a lunch hour), the card at the punching station should first be completely punched and released. Before the card is released, however, turn off the automatic feed switch. This permits restarting the job without additional card handling.

When one batch of work is to be followed by another batch using the same master information and program control, a blank card should follow the last card of the batch through the punching station. The blank card can be released past the punching station as the last card is released past the reading station. This causes the blank card to be automatically punched with the master information for duplication into the first card of the next batch, and thus eliminates the necessity of re-keying the master information. The automatic feed switch should be off when the cards are released.

Clearing the Card Bed

When the card bed is to be completely cleared at the end of a punching operation without feeding more cards from the hopper, turn off the automatic feed switch during the punching of the next-to-last card. The last card is then registered for punching by pressing the register key. After the last card is punched and moved to the center of the card bed, it is moved on to the stacker by pressing the register key, the release key, and then the register key again.

If the automatic feed switch is turned off after the last card to be punched is completed, press the release and register keys alternately three times. In this case, two blank cards stack behind the last punched card in the stacker.

Removing a Card from the Center of the Card Bed

To remove a card from the center of the card bed without affecting the following cards, manually move it into the reading station and press the release key. This moves it to the left of the card bed where is can be lifted out.

Removing a Card from the Left of the Card Bed

When a card has been released from the reading station but not stacked, it is in the left of the card bed. For easy manual removal, move the card to the extreme left by pressing down on the arm that extends from the reading station.

Removing a Card from the Punching or Reading Station

If for any reason a card must be removed manually from the punching or reading station, hold down the pressure roll release lever while pulling out the card. If a card at the punching station does not move easily, press all the numeric keys. Then, while holding down the lever, pull out the card without tearing it.

Spacing over Columns

Without program control, the duplicate key may be used to space over columns, if the same columns are unpunched in the preceding card or if there is no matic skip and duplicate switch. Because this requires the manual setting of the automatic skip-duplicate switch each time master information changes, consideration should be given to proper card design as an aid to most efficient operation.

Here are several recommended procedures for punching the *first card of each group*. The procedures vary depending on conditions brought about by differences in card design.

1. Whenever possible, program the first field in a card for manual operation. This gives the operator a chance to turn the automatic skip-duplicate switch off before starting to punch the first card of a new group.
   a. When the first card of a new group is registered at column 1, turn the automatic skip-duplicate switch off.
   b. Keypunch the complete card.
   c. When the second card of the group is registered at column 1, turn the automatic skip-duplicate switch on. (The switch could have been turned on after the master information was keypunched).
2. Automatic duplication should not immediately follow an automatic skip. Design a manually operated field between the two automatic operations if possible.
   a. Keypunch the first field.
   b. Automatically skip the second field (automatic skip-duplicate switch on).
   c. Turn off the automatic skip-duplicate switch. Keypunch the third field.
   d. Keypunch the fourth field. Turn on the automatic skip-duplicate switch.
3. Sometimes other factors in the use of the cards make it necessary for automatic duplication to follow an automatic skip. In such a case, study the possible procedures and follow the best one. Two procedures are outlined here.

   Long-Skip Field

   a. Keypunch the first field.
   b. Automatically skip the second field. During the skip, turn off the automatic skip-duplicate switch to prevent automatic duplication in the following field. This can be done if the skip is fairly long.
   c. Keypunch the third field and turn on the automatic skip-duplicate switch.

   Short-Skip Field

   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first field.
   c. Skip the second field by use of the skip key.
   d. Keypunch the third field and turn on the automatic skip-duplicate switch.
4. When automatic duplication is immediately followed by an automatic skip, the first card is punched as outlined here:
   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first field.
   c. Keypunch the second field. Either during, or at the end of, this field, turn on the automatic skip-duplicate switch, so that the following field can be automatically skipped.
   d. Automatically skip the third field.
5. If an automatic skip must come first in a card immediately followed by automatic duplication, the procedure for handling the punching is similar to that outlined in number 3 and is described here:

   Long-Skip Field

   a. Automatically skip the first field. During the skip, turn off the automatic skip-duplicate switch to prevent automatic duplication in the second field. This can be done if the skip is fairly long.
   b. Keypunch the second field and turn on the automatic skip-duplicate switch.
   c. Keypunch the third field.

   Short-Skip Field

   a. Turn off the automatic skip-duplicate switch before the last card of a group is punched in column 80.
   b. Press the skip key to skip the first field of the first card of the following group.
   c. Keypunch the second field and turn on the automatic skip-duplicate switch.
   d. Keypunch the third field.
6. When an automatic skip field comes between two fields programmed for automatic duplication, the first card is punched as outlined here:
   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first and second fields.
   c. Skip the third field by use of the skip key.
   d. Keypunch the fourth field and turn on the automatic skip-duplicate switch.

matic skip and duplicate switch. Because this requires the manual setting of the automatic skip-duplicate switch each time master information changes, consideration should be given to proper card design as an aid to most efficient operation.

Here are several recommended procedures for punching the *first card of each group*. The procedures vary depending on conditions brought about by differences in card design.

1. Whenever possible, program the first field in a card for manual operation. This gives the operator a chance to turn the automatic skip-duplicate switch off before starting to punch the first card of a new group.
   a. When the first card of a new group is registered at column 1, turn the automatic skip-duplicate switch off.
   b. Keypunch the complete card.
   c. When the second card of the group is registered at column 1, turn the automatic skip-duplicate switch on. (The switch could have been turned on after the master information was keypunched).
2. Automatic duplication should not immediately follow an automatic skip. Design a manually operated field between the two automatic operations if possible.
   a. Keypunch the first field.
   b. Automatically skip the second field (automatic skip-duplicate switch on).
   c. Turn off the automatic skip-duplicate switch. Keypunch the third field.
   d. Keypunch the fourth field. Turn on the automatic skip-duplicate switch.
3. Sometimes other factors in the use of the cards make it necessary for automatic duplication to follow an automatic skip. In such a case, study the possible procedures and follow the best one. Two procedures are outlined here.

   Long-Skip Field

   a. Keypunch the first field.
   b. Automatically skip the second field. During the skip, turn off the automatic skip-duplicate switch to prevent automatic duplication in the following field. This can be done if the skip is fairly long.
   c. Keypunch the third field and turn on the automatic skip-duplicate switch.

   Short-Skip Field

   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first field.
   c. Skip the second field by use of the skip key.
   d. Keypunch the third field and turn on the automatic skip-duplicate switch.
4. When automatic duplication is immediately followed by an automatic skip, the first card is punched as outlined here:
   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first field.
   c. Keypunch the second field. Either during, or at the end of, this field, turn on the automatic skip-duplicate switch, so that the following field can be automatically skipped.
   d. Automatically skip the third field.
5. If an automatic skip must come first in a card immediately followed by automatic duplication, the procedure for handling the punching is similar to that outlined in number 3 and is described here:

   Long-Skip Field

   a. Automatically skip the first field. During the skip, turn off the automatic skip-duplicate switch to prevent automatic duplication in the second field. This can be done if the skip is fairly long.
   b. Keypunch the second field and turn on the automatic skip-duplicate switch.
   c. Keypunch the third field.

   Short-Skip Field

   a. Turn off the automatic skip-duplicate switch before the last card of a group is punched in column 80.
   b. Press the skip key to skip the first field of the first card of the following group.
   c. Keypunch the second field and turn on the automatic skip-duplicate switch.
   d. Keypunch the third field.
6. When an automatic skip field comes between two fields programmed for automatic duplication, the first card is punched as outlined here:
   a. Turn off the automatic skip-duplicate switch when the card is registered at column 1.
   b. Keypunch the first and second fields.
   c. Skip the third field by use of the skip key.
   d. Keypunch the fourth field and turn on the automatic skip-duplicate switch.

Ribbon Replacement

The ribbon on the IBM 26 Printing Card Punch feeds between two spools, through ribbon guides, and under the punch die (Figure 27). The old ribbon is removed and a new one is inserted as follows:

1. Turn off the main-line switch.
2. Remove the ribbon-spool retaining clamp.
3. Cut or break the old ribbon.
4. Remove both spools from their spindles and pull out the two pieces of ribbon. Empty one of the spools.
5. Place the spool of new ribbon on the right-hand spindle, positioning it so that the ribbon feeds from the top of the spool toward the front of the machine. Lift the right end of the ribbon-reversing arm, if it is not already up, and unroll about a foot and a half of ribbon; then push down the right end of the ribbon-reversing arm to hold the spool steady.
6. Feed the metal leading-end of the ribbon between the punch die and the card bed, sliding it through the groove in the center of the card bed (between the *3* and *4* punching position). The groove permits the extra thickness of the metal end and the reversing eyelet to pass between the punch die and the card bed. Be sure to keep the ribbon straight, with the *top* side up at all times.
7. Hook the metal leading-end of the ribbon in the slot in the center of the empty spool and wind the ribbon onto the spool until the reversing eyelet is on the spool.
8. Place the spool on the left spindle, positioning it so that the ribbon feeds onto the spool over the top. Be sure that the ribbon is not twisted and that the *top* side of the ribbon is still up.
9. Hook the ribbon around the right and left wire ribbon guides, and slide it through the right and left ends of the reversing arm and over the rollers in front of the ribbon spools.
10. Slide the ribbon up under the punch die so that it is in the upper groove provided for it in card-printing position (above the 12-punching position), and take up the slack.
11. Replace the ribbon-spool retaining clamp.

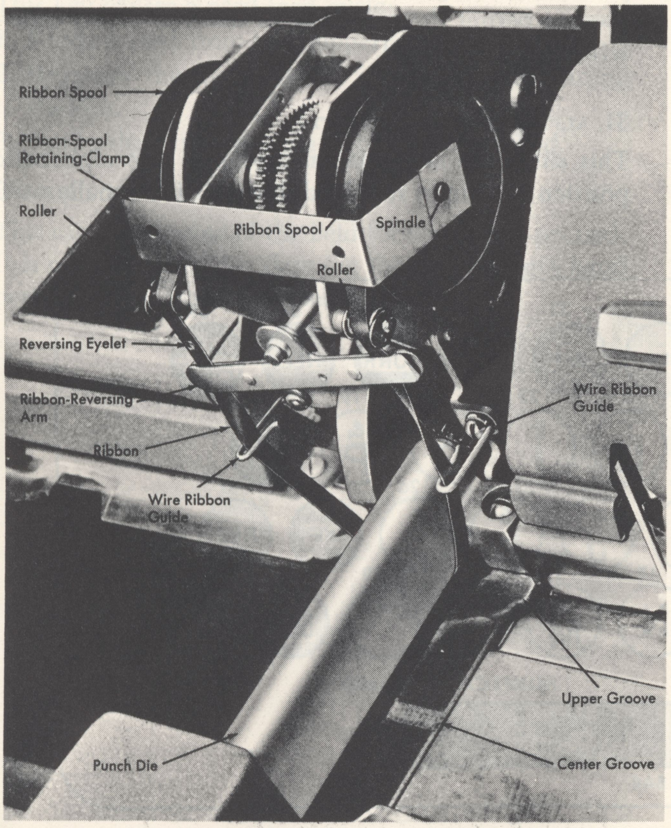

Figure 27. Ribbon Replacement

Combination Keyboard Summary

On the keyboard chart (Figure 28) each key is numbered for purposes of description in the following summary.

Punching Keys

Keys 1-18 can be pressed only when the keyboard is in alphabetic shift to punch the letters indicated. If one of these keys is pressed while the keyboard is in numeric shift, the machine locks. To resume operation release the card, or press the alphabetic shift key, which causes the letter to be punched.

Combination keys 19-29 can be pressed when the keyboard is in either numeric or alphabetic shift to punch these characters:

Key	*Numerical Shift*	*Alphabetic Shift*
19	& (12)	P
20	0	/ (0, 1)
21	1	U
22	2	I
23	3	O
24	4	J
25	5	K
26	6	L
27	7	M
28	8	8
29	9	9

On the combination keyboard, keys 40-43 punch multiple digits for eight special characters. They can be pressed when the keyboard is in either numeric or alphabetic shift to punch these characters:

Key	*Numerical Shift*	*Alphabetic Shift*
40	# (3, 8)	@ (4, 8)
41	, (0, 3, 8)	% (0, 4, 8)
42	$ (11, 3, 8)	* (11, 4, 8)
43	• (12, 3, 8)	⌑ (12, 4, 8)

Space Bar

The space bar can be pressed at any time in a manual field to cause spacing over one column of the card. If a machine is not equipped with a multiple-punch key, hold down the space bar to permit multiple punching in the same column.

Functional Keys

30. NUM (NUMERIC SHIFT)

This shifts the combination keyboard into numeric position as long as it is held down. It is normally used to permit the punching of numbers in an otherwise alphabetic field.

31. ALPH (ALPHABETIC SHIFT)

This shifts the combination keyboard into alphabetic position as long as it is held down. It is normally used

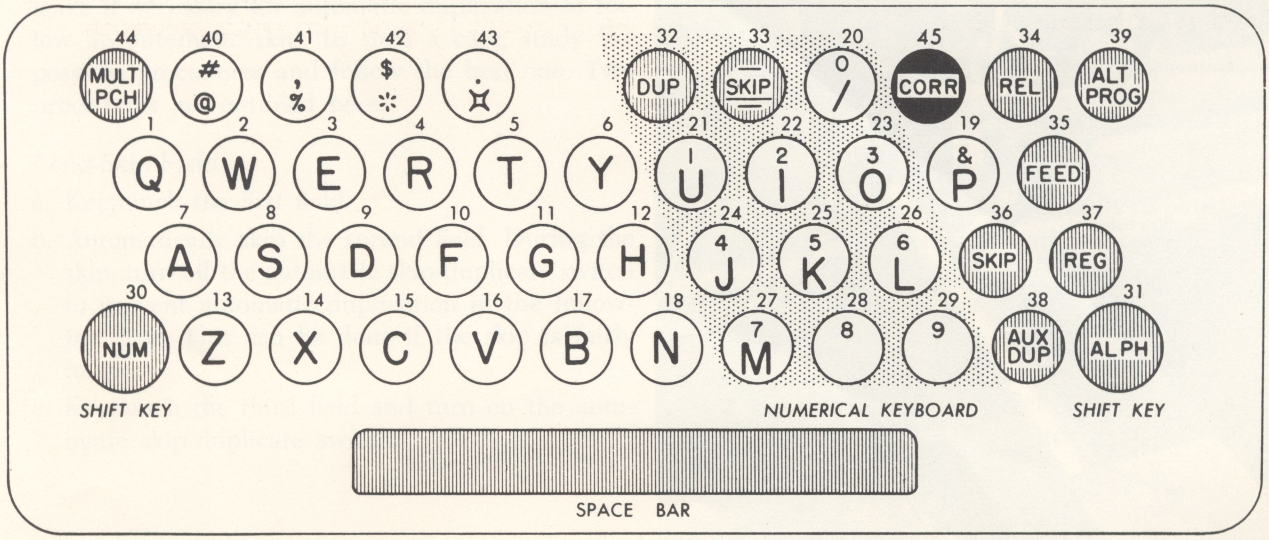
44 MULT PCH
40 # @
41 , %
42 $ *
43 • ⌑
32 DUP
33 SKIP
20 0 /
45 CORR
34 REL
39 ALT PROG
1 Q
2 W
3 E
4 R
5 T
6 Y
21 1 U
22 2 I
23 3 O
19 & P
35 FEED
7 A
8 S
9 D
10 F
11 G
12 H
24 4 J
25 5 K
26 6 L
36 SKIP
37 REG
30 NUM
13 Z
14 X
15 C
16 V
17 B
18 N
27 7 M
28 8
29 9
38 AUX DUP
31 ALPH
SHIFT KEY
NUMERICAL KEYBOARD
SHIFT KEY
SPACE BAR

Figure 28. Combination Keyboard Chart

to permit the punching of letters in an otherwise numeric field. When duplication is being performed, this key permits automatic spacing over blank columns and prevents skipping caused by X-punching.

32. DUP (DUPLICATE)

This key causes punching by reading from the preceding card.

With Program Control. Pressing this key once causes duplication of the *field* for which it is pressed, at the rate of 20 columns per second.

Without Program Control. Causes duplication only as long as the key is held down, at the rate of 10 columns per second.

33. —SKIP (OR)—

—SKIP *in Numeric Shift.* Punches an 11 (—) and causes skipping of the field for which it is pressed.

—*in Alphabetic Shift.* Punches an 11 (—).

34. REL (RELEASE)

Causes the cards at the punching and reading stations to be advanced completely past those stations. Fields programmed for automatic duplication beyond the point of release are punched in the card before release is completed.

35. FEED (CARD FEED)

This key causes a card-feed cycle:

1. Feeds a card from the hopper.
2. Registers the cards at the punching and reading stations.
3. Stacks the card from the left of the card bed.

36. SKIP

This causes skipping of the field for which it is pressed. It is normally used for skipping the unused right-hand portion of an alphabetic field.

37. REG (CARD REGISTER)

This key is used primarily when inserting cards manually:

1. Registers the cards at the punching and reading stations.
2. Stacks the cards from the left of the card bed.

38. AUX DUP (AUXILIARY DUPLICATE)

This is supplied only when the machine has the auxiliary duplication feature. It causes duplication from the master card on the auxiliary duplicating drum. Under program control, pressing the key once duplicates the entire field from the master card; without program control, pressing it once duplicates one column from the master card.

39. ALT PROG (ALTERNATE PROGRAM)

Supplied only when the machine has the alternate program feature. Press this key, either at the beginning or during the card cycle, for each card requiring alternate instead of normal program control. If the key is pressed when a card is *not* registered at the punching station, it also causes a feed cycle.

44. MULT PCH (MULTIPLE PUNCH)

This is held down to permit the punching of more than one digit in a column. The keyboard is in numeric shift when this key is pressed.

45. CORR (CARD CORRECTION)

Supplied only when the machine has the card correction feature. Press this key upon detecting an error and before keying the next column of information. This action moves the error card to the read station and reproduces the information (up to the error column) into a new card at the punch station. Then, key in the correct information and resume operation.

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